# Subject Index

A

Absorptometers; use of, in water analysis, 344

Accounted-for water; see also Unaccountedfor water

as clue to system efficiency, 157

Accounting costs; relation of, to equitable rates, 671

Accounts; classification and system of, 1 method of keeping, in small water works, 543

Accuracy; meter; possible degree of, 908 Acid; pollution by, as result of coal strip mining, 752, 763

Administration; business principles in, 1176 office; procedure for, in small water works, 543

value of rules and regulations in, 1165
Aerator; coke tray; use of, for iron removal, 682

Aerobacter aerogenes; see Bacteria

Algae; role of, in promoting corrosion, 322 use of chlorine dioxide to control tastes and odors from, 689

Alumina; effect of, upon zeolite exchange capacity, 1135

Ambridge, Pa.; new water field development at, 750

Amendments; proposal of, to A.W.W.A. Constitution, 526

America; water works practice in, compared to Sweden, 547

American law; principles of, governing ground water appropriation, 991

American Society of Civil Engineers; unionization policies of, 858

American Water Works Association; audit of funds for 1946, report of, 273

committee reports and activities; correlating committee on cathodic protection, 1086, 1087, 1088

joint administration and collection of water and sewer accounts, 1032

municipal water works organization, 783, 787

radio facilities for water works, 1099 revenue bond legislation, 1032 water works practice, 265

Constitution; proposed amendments to, 526

A.W.W.A. (contd.); Journal; style manual for authors, 473

publications report, 262

specifications; standard; for coal-tar enamel protective coating for steel water pipe 30 in. and over; erratum to Sixth and Seventh Printings of, 542

Balt

Base

Beg

Ben

Bent

B.G.

Billi

Bitu

Bono

rev

use

Book

Boos

Boulo

Broad

Burea

Calciu

stab

Calcut

Calgor

Califo

ar

nece

relat

reve

valu

I

t

I

tentative; fire service type cold water meters, 173

for current type cold water meters; revision of, 466

for threads for underground service line fittings, 1059

Ammonia; see Chloramination; Treatment Ammonium; quaternary; main sterilization by compound of, 1038

Analysis; see also Photometry; Titration colorimetry and photometry used in, 341 requirement and usefulness of Standard Methods for, 735

water and sewage; errata to Ninth Edition of Standard Methods, 528

Anthracite; use of, in contact filter removal of iron and manganese, 682
Anti-corrosive measures; see Corrosion con-

trol Appropriation; ground water; legal aspects

Appropriation; ground water; legal aspects of, 989

water; California doctrines for, 232, 430 complexity of, in Colorado River basin, 951

effect of California litigation on, 231 legal aspects of, 991

Appropriations; congressional; see Government; federal

Aqueduct; booster pumping to increase capacity of, 133

Aquifers; see Geologic formations; Ground water

Arizona; relation of, to resources of Colorado River, 946

Arizona-California controversy; basis for, in Colorado River, 963

Army; see Military Artesian wells; see Ground water

Artificial recharge; practice of, to increase capacity of aquifers, 744

Audit of Association funds; report of, 273 Authors; style manual for, 473

Automatic control; radio facilities for, 10% Automobiles; maintenance of, 515

# Subject Index

A

Absorptometers; use of, in water analysis, 344

Accounted-for water; see also Unaccountedfor water

as clue to system efficiency, 157

Accounting costs; relation of, to equitable rates, 671

Accounts; classification and system of, 1 method of keeping, in small water works, 543

Accuracy; meter; possible degree of, 908 Acid; pollution by, as result of coal strip mining, 752, 763

Administration; business principles in, 1176 office; procedure for, in small water works, 543

value of rules and regulations in, 1165
Aerator; coke tray; use of, for iron removal, 682

Aerobacter aerogenes; see Bacteria

Algae; role of, in promoting corrosion, 322 use of chlorine dioxide to control tastes and odors from, 689

Alumina; effect of, upon zeolite exchange capacity, 1135

Ambridge, Pa.; new water field development at, 750

Amendments; proposal of, to A.W.W.A. Constitution, 526

America; water works practice in, compared to Sweden, 547

American law; principles of, governing ground water appropriation, 991

American Society of Civil Engineers; unionization policies of, 858

American Water Works Association; audit of funds for 1946, report of, 273

committee reports and activities; correlating committee on cathodic protection, 1086, 1087, 1088

joint administration and collection of water and sewer accounts, 1032

municipal water works organization, 783, 787

radio facilities for water works, 1099 revenue bond legislation, 1032 water works practice, 265

Constitution; proposed amendments to, 526

A.W.W.A. (contd.); Journal; style manual for authors, 473

publications report, 262

specifications; standard; for coal-tar enamel protective coating for steel water pipe 30 in. and over; erratum to Sixth and Seventh Printings of, 542

Balt

Base

Beg

Ben

Bent

B.G.

Billi

Bitu

Bono

rev

use

Book

Boos

Boulo

Broad

Burea

Calciu

stab

Calcut

Calgor

Califo

ar

nece

relat

reve

valu

I

t

I

tentative; fire service type cold water meters, 173

for current type cold water meters; revision of, 466

for threads for underground service line fittings, 1059

Ammonia; see Chloramination; Treatment Ammonium; quaternary; main sterilization by compound of, 1038

Analysis; see also Photometry; Titration colorimetry and photometry used in, 341 requirement and usefulness of Standard Methods for, 735

water and sewage; errata to Ninth Edition of Standard Methods, 528

Anthracite; use of, in contact filter removal of iron and manganese, 682
Anti-corrosive measures; see Corrosion con-

trol Appropriation; ground water; legal aspects

Appropriation; ground water; legal aspects of, 989

water; California doctrines for, 232, 430 complexity of, in Colorado River basin, 951

effect of California litigation on, 231 legal aspects of, 991

Appropriations; congressional; see Government; federal

Aqueduct; booster pumping to increase capacity of, 133

Aquifers; see Geologic formations; Ground water

Arizona; relation of, to resources of Colorado River, 946

Arizona-California controversy; basis for, in Colorado River, 963

Army; see Military Artesian wells; see Ground water

Artificial recharge; practice of, to increase capacity of aquifers, 744

Audit of Association funds; report of, 273 Authors; style manual for, 473

Automatic control; radio facilities for, 10% Automobiles; maintenance of, 515 manual

coal-tar

T steel

erratum

ngs of,

water

meters;

SETVICE

ment

ation

, 341

tandard

h Edi-

emoval

on con-

aspects

32, 430

basin,

231

overn-

ase ca-

Ground

Colo-

is for,

crease

273

, 1098

lization

#### В

Bacteria; growths of, in pipelines, 1107 media used in presumptive tests for, 337 zeolite softener fouling by, 779 Bactericidal action; see Chlorination; Steri-

lization
[acteriological examination; selection of

Sampling points for, 1128
Saltimore; enlargement of water system

of, 119 Pargaining; see Collective bargaining

Base-exchange; see Zeolite Beggiatoa; see Bacteria

Beneficial use; principles of, governing ground water appropriation, 997

Rentonitic clay; classification of, as zeolite, 1133

B.G.B.; comparison of, and lauryl sulfate tryptose broth, 337

Billing; rules governing, 1168, 1176

Bituminous coatings; use of, for protecting pipelines against corrosion, 776, 1181 Bonds; revenue; Indiana regulation of, 620

legislation for, 1021, 1032
revenue and general obligation; for financ-

ing improvements, 331

use of, for financing sanitary district, 872, 877, 893

Bookkeeping; see Accounts

Booster pumping; see Pumping, booster
Boulder Canyon Project Act; Colorado
River development authorized by, 955
Broad special fund theory; application of,

to revenue bonds, 1024
Bureau of Reclamation; see Government;
U.S.

## C

Calcium; effect of, upon zeolite exchange capacity, 1139

stabilization of, facilitated through solubility calculations, 1090

Calcutta, India; military sanitation in, 416 Calgon; see Phosphate, vitreous

California; effect of litigation upon water appropriation in, 231

necessity for legislation in, to protect ground water from pollution, 1003

relation of, to resources of Colorado River, 945

revenue bond legislation provisions for, 1021

value of ground water records kept by, 969

California-Arizona controversy; basis for, in Colorado River, 963

California ground water; geochemical tracing of sources of, 423

California water supply; development of, 430 Camp Roberts, Calif.; water for Army installation at, 972

Capacity; pipeline; reduction of; see Corrosion; Tuberculation

relation of lining to, 1181

restoration of, by cleaning, 775, 1107 tank; economic factors determining, 641, 644

water; estimation of, in South American water supply development, 398 well; see Wells

Capacity costs; relation of, to fire protection charges, 625, 669

Capital; amount of, invested in water supply in U.S., 774

Carbon dioxide; formation of, in basins and reservoirs, 1227

removal of, to control corrosion, 778

Caries; dental; use of fluorides to prevent, 836

Cases; court; see Litigation
Cathodic interference, 1081, 1087
Cathodic protection; see also Corrosion
application of, to pipelines, 1080

correlating committee for, 1086, 1087, 1088 value of, 657

Cement; see also Concrete Cement-lined pipe; use of, to combat corro-

sion, 775, 1181 Census; use of, in South American water supply development, 397

Channels; open; reducing cost of, 635 straightening of, for Neosho River flood control, 677

Charges; see also Rates

fire protection; methods of fixing, 623, 668 minimum; determination of, on basis of consumption patterns, 828

service; determination of, on basis of consumption patterns, 828

sewerage; see Sewerage charges Chemical treatment; value and hazards of,

834 Chemists; additional accomplishment needed

from, 865
Chezy; pipe flow formula of, analysis of, 568
Chicago; leakage location and stopping in,
713

testing and inspection of materials and equipment in, 722

Di

Co

t

Cor

C

CC

pi

50

st

ta

va

Wa

Corr

Cost

ch

col

I

5

f

cor

fire

labo

met

ope

pipe

DOW

redu

rela

serv

softe

tank

Court

Covena

Crenot

Cross-

Dam:

Damag

descr

ha

lin

fe

Chloramination; see also Treatment control of slime growths by, 1108 practice of, at Washington Aqueduct, 1237 Chlorination; see also Chloramination; Chlo-

rine; Chlorine dioxide; Treatment control of slime growths by, 1108 free residual; development of, 1242 use of, for iron and manganese removal,

history and contemporary practices of, 200, 800

Chlorine; see also Chlorination

bactericidal properties of, compared to chlorine dioxide, 561

residual; automatic analyzer for, 693 ortho-tolidine titration for, 209

Chlorine dioxide; bactericidal properties of, 561

review of use of, 687

theory of taste and odor reduction by, 691 use of, in Quebec, 800

Civil service employees; see Employees; public

Clay; bentonitic; classification of, as zeolite, 1133

Cleaning; chemical method of, for porous concrete wells, 729

mechanical methods of, for pipelines, 775, 1108

Clinkers; removal of, in lime slakers, 467 Coagulation; history of, in Quebec, 800

Coal strip mining; pollution of water supplies by, 751, 757, 760, 768

Coal-tar enamel; erratum to specifications

for, 542 use of, for protecting pipelines against

corrosion, 776, 1181 Coal-tar pipe dip; effectiveness of, against

pipeline corrosion, 774 Cobalt; catalytic action of, in chemical fixa-

Cobalt; catalytic action of, in chemical fixa tion of oxygen, 1123

Coefficient; friction; see Flow; pipe Colebrook; pipe flow formula of, analysis of, 568

Coliform organisms; see Bacteria Collective bargaining; advantages of, 861 engineers' organizations for, 855

limitations in exercise of, for public employees, 844

Collectors; radial water; construction and uses of, 742, 747

Color comparometer; use of, in water analysis, 343

Color test; measurement of velocity in pipelines by, 1195

Colorado; relation of, to resources of Colorado River, 946

Colorado River; conflicting allocations of water from, 440 resources of, 945

Colorado River Compact; appropriation of water under, 951

Colorimetry; use of, in water analysis, 341 Committee reports; see American Water Works Association

Commodity costs; water; relation of, to equitable rates, 671

Common law; principles of, governing water appropriation, 991

Communications; radio; see Radio Comparator; see Color comparometer Comparometer; see Color comparometer Concrete; use of, to prevent corrosion in

pipelines, 1107 waterproofing of, 253

Concrete wells; chemical cleaning of, 729 Connecticut; treatment methods in, 65, 70 Conservation; see Development; Forestry, Water supply

water; legislation in aid of, 527, 795 Constitution; A.W.W.A.; proposed amend-

ments to, 526
Construction; see also Development; Extensions; Repair

Baltimore; additions to system, 119 bond financing of, 331

Midland, Pa.; filtration plant, 361 northern South America; water supply development in, 397, 411

Philadelphia; additions to system, 123 problems of, in 1946, 57

sanitary district plan for financing of, 87, state reports of obstacles to, 607 tank; see Tanks

Washington, D.C., 291

water supply; history of, in Illinois, 661 West Penn Water Co., Pa.; new supply 770

Yuma, Ariz., 245

Construction costs; see Costs

Consumption; see Demand study of patterns of, as basis for setting rate schedules, 826

Contracts; main extension, 260, 1069, 1073 1077

Cooling water; Indiana legislation regulated Custom ing use of, 527, 792

Copper sulfate; attempt to control Limne phora by, 1109

Corps of Engineers; see Government; US Correlative rights; American rule of, goerning ground water appropriations, % WWA

ions of

ition of

sis, 341

Water

01, 10

ng wa-

er

neter

osion in

f, 729

65, 70

orestry;

amend-

it; Ex-

supply

123

of, 87

is, 661

supply

regulat

Limne

of, gov-

ions, 99.

9

95

Corrosion; cost of; in all pipelines, 143, 1079, 1086

in water pipelines, 773 deep well, as cause of failure, 34 measurement and control of, 220 role of algae in promoting, 322 theory of, 1079

Corrosion control; cathodic protection for, 657, 1080

concrete pipe and linings for, 1107 cost of, for pipelines, 143, 774, 1081 oxygen removal for, 1121 pipe linings for, 774, 1081, 1181 sodium phosphate for, 552 studies on, 220 tank; cathodic protection for, 657 various methods of, and costs, 774

water softening in relation to, 777 Corrosive water; see Corrosion Costs; see also Accounts; Economics chemical, for treatment plants, 156 construction; effect of rise in, on water

rates, 824 methods of reducing, 630, 864 price adjustment clauses affecting, 60 relation of, to municipal finances, 326 state reports of increases in, 609 corrosion; to water industry, 773

for pipelines, 143 fire protection; method of determining,

625, 669 labor; see Wages meter repair, 168

operating; effect of war on, 821 for treatment plants, 151 pipeline cleaning, 1110 power tool maintenance, 516 reduction of, through use of storage, 637,

relation of rising levels of, to rates, 116,

service installation, at Richmond, Va., 29 softening, 147

tank; comparative, 640, 649 Court decisions; see also Litigation limiting revenue bond usage, 1024 setting Covenants; bond; analysis of, 1029 Crenothrix; see Bacteria

69, 1075 Cross-connections; sampling to check on hazard from, 1129

Customers; charges for; see Rates

nt; U.S. Dam; Hoover; building of, 948, 954 description of, in Washington Suburban Sanitary District, 897

Damage suits; see Litigation

Darcy f; analysis of pipe flow formulas in terms of, 568

De-aeration; vacuum; possible use of, for corrosion control, 1121

De-chlorination; practice of, 1239, 1341

Debt limitations; revenue bond as means to escape, 331, 620, 1021-

Deep wells; see Wells

Defense; national; value of ground water studies to, 969

Demand; fire protection; determination of, 627, 669

water; estimation of, in South American water supply development, 398 of various plumbing fixtures, 27, 196

Density currents; effect of, upon raw water quality at intake, 357

Dental caries; use of fluorides to prevent,

De-oxygenation; see De-aeration

Depreciation; relation of, to fire protection charges, 627, 670

Design; tank; considerations of appearance in, 651

considerations of utility and capacity in, 641, 644

Detergents; synthetic; sterilization with, 1038

Development; Neosho River Basin; Kansas plan for, 673

water supply; in California, 430, 949 in Illinois; a history of, 659 in South America, 397, 411 in Southwest, 949

Diameter; pipe; accurate determination of, 1193

Disease; see Malaria

Disinfection; see Chlorination Dissolved oxygen; see Oxygen

Distribution systems; see also Construction Extension; Leakage

description of, in Washington Suburban Sanitary District, 899

leak survey and repair program for, 713 numerical rating system for evaluation of, 926, 928

per capita amount and cost of, required for service, 774

waste and losses in, 157

District; sanitary; suburban Washington, 869 District of Columbia; system expansion in, 291

Drainage; storm; sanitary district provisions for, 893

Drinking Water Standards; requirements and usefulness of, 734

Drying; effect of, upon zeolite exchange capacity, 1135

#### E

Easement; see Rights of way

East Bay Municipal District; control of erosion in watershed of, 1229

Economics; see also Costs

relation of; to meter rates, 115 to water storage, 637, 644

Economies; methods of obtaining, in construction, 630

Elevated tanks; see Tanks

Emergencies; New York program for mutual aid in, 520

Employee relations; effects of, upon public relations, 42, 43, 49

Employees; see also Labor; Unions

engineering; organizations of, for collective bargaining, 855

inspection; qualifications and duties of, 724 labor legislation affecting, 846, 858

numerical rating system for evaluation of, 926, 928

pension system for, 789, 1177

public; legislation forbidding strikes by, 844 sanitary district policies for, 874

selection, training and rating of, 47, 1177 training of, to improve customer relations, 464, 1177

Employment; public and private; status of personnel in, 847

Enamel; coal-tar; see Coal-tar enamel

Enamel; tooth; relation of fluorine to condition of, 836

Engineering; importance of, in South American water supply development, 401

Engineers; organizations of, for collective bargaining, 855

English law; principles of, governing water appropriation, 991

Entamoeba histolytica; destruction of, by quaternary ammonium germicide, 1038

Eric process; use of, for protecting pipelines against corrosion, 775

Erosion; control of, in watersheds, 1224, 1229

control of, in Neosho River Basin, 675

Escherichia coli; see Bacteria Exchange capacity; see Zeolite

Expenses; see Costs

Extensions; see also Construction

current practices for constructing, 257, 872, 1070, 1073

policy recommended for, 1067 rules governing, 1168

### F

Failures; deep well, causes of, 32

Fanning; pipe flow formula of, analysis of, 568

Federal government; see Government, U.S. Federal Public Works Administration; see Government; U.S.

Fee title; see Rights of way

Filter wash system; Blaisdell machine type, 250

erosion and repair of, 235

Filters; description of, in Washington Suburban Sanitary District, 895 history of, in Quebec, 797

Filters; optical; transmittances of, as used in water analysis, 347

Filtration; see also Filter, Treatment use of, for iron removal, 682

Filtration plant; construction of, at Midland, Pa., 361

Finances; municipal; and support of public services, 325, 333 system of accounting for, 1, 543

Financing; extension construction, 257, 872 1067

revenue bond; legislation for, 1021, 1032 revenue or general obligation bonds for 331

sanitary district; methods used for, 872 877, 893

water works; in Montana, 783 Fire hydrants; see Hydrants

Fire protection; methods of fixing charge for, 623, 668

relation of, to forestry, 88, 1234
Fire service meters; specifications for, 173
Fittings; service line; specifications for

Fittings; service line; specifications for threads for, 1059 Flood control; measures taken for, in Colo-

rado River basin; 949
Neosho River Basin; Kansas plan for, 67

Flow; ground water; rate of, 739 pipe; analysis of formulas for, in terms of

Darcy f, 568 effect of lining upon, 1181 reduction of, by slime growths, 1107 studies of, 1191

Fluorides; addition of, to water, for mass medication, 835

effect of, upon zeolite exchange capacity 1143 influence of phosphates on determination

of, by zirconium-alizarin, 52 Food; sanitary control of in Calcutta, India 422

Foremen; improvement required in, 864 Forest Service; U.S.; research by, 444 Forestry; practice of; in Virginia, 455

on East Bay watershed, 1233 on Newark, N.J., watershed, 87 research on, 444

Formulas; pipe flow; analysis of, in term of Darcy f, 568

Port I

Fort O

Fouling sof

Free re Free w amou

Frequent Fresh w sour

Funds; nici

Gaging :

of, Geologic ground origin, is

Geologic
U.S.
Geology
wate
Germicid
Germs;

Ghyben-l islan Governm lic Governm pedit

Colo flood grou Hous

radio recla resea

soil stream water

municip ices state;

admir p VA

J.S.

see

ype

used

Mid-

ablic

872

1032

for

arge

173

Colo-

, 673

mass

acity

nation

India

term

Fort Dix, N.J.; water for Army installation at, 976

Fort Ord, Calif.; water for Army installation at, 972

Fouling; microbial; correction of, in zeolite softener, 779

Free residual; see Chlorination

Free water; see also Unaccounted-for water amounts and purposes of, in Minnesota, 540

necessity of eliminating, 1207 Frequencies; radio; see Radio

Fresh water; lens of, as island ground water source, 980

Friction; coefficient of; see Flow; pipe Funds; water works; use of, for other municipal services, 1177

### G

Gaging; flow, 1191

Galleries: infiltration; construction and uses of, 742

Geologic formations; see also Ground water 872 ground water from, in Wisconsin, 93, 370 origin, types and water-bearing characteristics of, 740

Geological Survey; see Government, U.S.; U.S. Geological Survey

Geology; see Geologic formations; Ground water

Germicide; see Chlorination; Sterilization

Germs; see Bacteria

Ghyben-Herzberg lens; significance of, as island ground water source, 980 Government employees; see Employees; pub-

Government regulations; see Housing Ex-

ns of pediter Government; U.S.; see also Legislation, U.S. Colorado River development by, 952, 955

flood control by, 673

ground water studies by, 968 Housing Expediter's Priorities Regula-

tion No. 7, 199 radio licensing by, 384, 458, 1100

reclamation and erosion control by, 1226

research in forestry by, 444

soil conservation assistance from, on East Bay watershed, 1232

stream pollution abatement by, in Tennessee, 356

water development by, 430

municipal; taxes, finances and public services of, 325, 333

state; see also Interstate

administration of ground water appropriation rules by, 997

Grades; street; sanitary district control over, 875

Gradient; hydraulic; determination of, 1192 Gravity filters; see Filters

Greensand; classification of, as zeolite, 1133 Ground water; see also Supply sources; Water table; Wells

artificial recharge of, 744

Charleston, W.Va.; erratum on 1946 paper on, 40

depletion of, in Indiana, 792

in Kansas, 676

legal principles affecting, 527, 795, 999 development and depletion of, on Pacific islands, 979

development of, at Ambridge, Pa., 750 geochemical tracing of sources of, 423 Illinois; history of development of, 659

improvement in quality of, by sealing aquifers, 380

Indiana legislation regulating use of, for cooling, 527, 795

legal aspects of appropriation of, 989 legal definition of, 996, 1014

legislation limiting withdrawal of, 527, 795

legislation on pollution of, 1003, 1110 Pennsylvania studies of, 745

physical and chemical properties of, 741 pollution of, necessity for legislation to prevent, 1003, 1010

review of collection and development methods for, 739

value of studies of, at Army installations in U.S., 968

Washington Suburban Sanitary District, use of, 887

Wisconsin; supplies of, 93, 369

Gunite; use of, in Halifax, N.S., reservoir reconstruction, 507

## H

Halifax, N.S.; reservoir reconstruction in.

Hardness; see also Softening

in Wisconsin ground waters, 97 costs of removing, 147

effect of, upon zeolite exchange capacity, 1135

excessive, as result of coal strip mining, 753, 763

Harriman, Tenn.; effect of density currents upon raw water quality for, 357

Hawaii; ground water conditions on, 979 Hazards; numerical rating system for evaluation of, 923, 928

Hazen-Williams; see Flow, pipe

Health; dental; use of fluorides to protect, 836

Head; loss of, in long pipelines, 1191

Hexachlorethane; chlorinator fouling by,

Hexametaphosphate; see Phosphate; vitreous Holder v. Windsor Utilities Com.; water quality litigation, 529 Honolulu, T.H.; ground water conditions

at, 979

Hoover Dam; building of, 948, 954

Horizontal well; see Radial water collector Housing Expediter; Priorities Regulation No. 7, 199

Hyamine 1622: see Quaternary ammonium Hydrant charges; levy of, for fire protection, 623, 668

Hydrants; rules governing, 1168

spacing of, in Washington Suburban Sanitary District, 899

value of standardizing, 470

Hydration; effect of, upon zeolite exchange capacity, 1135

Hydraulic studies; procedure for, 1191

Hydraulic tables; for analysis of pipe flow formulas in terms of Darcy f, 572

Hydroelectric power; production of, from Colorado River, 959

Hydrologic cycle; relation of, to ground water, 739

Hydrology; watershed; research on, 446 Hypochlorination; history of, in Quebec, 798

Igneous rocks; origin, types and waterbearing characteristics of, 740

Illinois; history of water development in, 659

municipal water works organization in, 787 utility pension plan in, 789

Incinerator; operation of, by Washington Suburban Sanitary District, 890

Incrustation; deep well, as cause of failure,

India; Calcutta; military sanitation in, 416 Indiana; legislation regulating use of ground water for cooling, 527, 792

organization and financing in, 619 Industrial wastes: see Wastes: industrial

Industry; damage to water for, from pollution, 1017

reducing pollutional loads from, 532, 1018 Infiltration; see also Forestry

Infiltration galleries; construction and uses

Inflation; see Costs, construction; Economics Inspecting; pipeline; use of radio for, 1098 procedure for, and testing of materials and equipment, 722

Installation; see Construction

Inter-connections; New York mutual aid program providing for, 520

Interference; cathodic, 1081, 1087

Interior; Department of; see Government: U.S.

Interstate agencies; control of stream pollution by, 1012

Investment; water works; in U.S., 774 Iodine; addition of, to water, for mass medication, 835

Iron; stabilization of, by sodium metaphosphate, 555

Iron removal; see Treatment

extent, methods and relation of, to corrosion control, 777

free residual chlorination for, 680

Irrigation; damage to water for, from pollution, 1017

extent and encouragement of, in Colorado River basin, 961

southern California; development to supply, 431

#### J

Joints; pipe; sterilization of packing for, by a quaternary ammonium germicide, 1038 hydrostatic and soap tests of, 1118

Journal American Water Works Association; style manual for authors, 473

Jute packing; sterilization of, by quaternary ammonium germicide, 1038

## K

Kansas; plan for Neosho River development in, 673

Kansas City, Mo.; rules and regulations in

Kutter; pipe flow formula of, analysis of 568

Labor; see also Employee; Unions

Labor market; cost of and troubles in, as incentive to improvement of methods

Labor unrest; causes of, among public employees, 849

Laboratories; shipment of water samples to 1131

Latin America; see South America; Vene zuela

Lauryl sulfate triptose broth; use of, a presumptive medium, 337

Decen Law;

adva

prin g

Lawsu Leaka

12 mag Legisla Allia

Cali ne

India res

labor Los Mary

inter

neces New

Ohio for Penn

mu

state ; p for nec

U.S. : aut

for Wa Virgin

Lens; ( isla Levees; Level; v

WA

aid

ent;

pol-

nedi-

hos-

orro-

ollu-

rado

sup-

r. by

1038

ocia-

nary

elop-

s in

of,

ods

em-

s to.

ene-

Law; see also Legislation; Liability; Litigation

advantages of pipeline rights of way under, 128

principles of; governing ground water appropriation, 989

governing water appropriation in California, 430

Lawsuits; see Litigation

Leakage; locating and stopping of, 159, 713, 1206

magnitude of, in Minnesota, 541

Legislation; see also Law; Litigation

Alliance, Ohio; financing of main extensions, 258

California; for revenue bond financing, 1021, 1034

necessity for, to protect ground water from pollution, 1003, 1010

Indiana; proposals for, to safeguard water resources, 795

regulating use of ground water for cooling, 527, 795

interstate; to protect ground water from pollution, 1012

labor, 846, 858

Los Angeles; for revenue bond financing, 1021

Maryland; creating and organizing sanitary district, 871, 874, 878, 893

necessity for, to protect ground water from pollution, 1003, 1010

New York; forbidding strikes by public employees, 846 mutual aid program, 520

Ohio; authorizing revenue bond financing,

forbidding strikes by public employees, 846

Pennsylvania; governing pollution and coal strip mining, 758

state; forbidding strikes by public employees, 846

for revenue bond financing, 1034 necessity for, to protect ground water from pollution, 1010

U.S.; see also Government, U.S.

authorizing Colorado River development, 952

for water development, in California, 430 Wagner Act for labor relations; status of engineers under, 858

Virginia; stream pollution control, 532

Lens; Ghyben-Herzberg; significance of, as island ground water source, 980

Levees: see Flood control

Level; water; see Ground water; Water table

Liability; see also Law; Litigation extent of, for flood protection, 1226

likelihood of, for discharge of softening, wastes, 1220

Lime; corrosion control by addition of, 778 Limited special fund theory; application of, to revenue bonds, 1025

Lime slakers; clinker remover for, 467 Limnophora; attempt to control, 1109

Lining; pipe; methods and effectiveness of, 774, 1181

Litigation; see also Court decisions; Legislation; Liability

Arizona-California; over Colorado River, 963

California; effect of, upon water appropriation, 231

Colorado River; between Arizona and California, 963

discharge of softening wastes, 1220

Florida; affecting sewer service charges, 1035

Pennsylvania; for damages resulting from coal strip mining, 754, 756, 760, 769, 770

Windsor, Ont.; on water quality; Holder v. Windsor Utilities Com., water quality dispute, 529

Location; tank; economic factors determining, 640

Los Angeles; control of erosion in watersheds of, 1224

relation of, to resources of Colorado River, 945

revenue bond charter provisions for, 1021 value of metering to, 906

Los Angeles coastal plain; geochemical tracing of sources of ground waters of,

Lumbering; see Forestry

## M

Machines; maintenance of, 515

Magnesium; effect of, upon zeolite exchange capacity, 1139

Maine; treatment methods in, 77

Mains; see Distribution systems; Pipelines effect of disorganized street grades upon laying of, 875

Maintenance; see also Depreciation; Repair meter; routine for, 165, 168

power tools; routine for, 515 value of radio service to, 384, 1097

wells; see Wells

Malaria; military control of, in Calcutta, India, 421 Management; improvement required in, 864 relations of, with labor, in government, 844

Manganese; removal of; by free residual chlorination, 680

extent, methods and relation of, to corrosion control, 777

stabilization of, by sodium metaphosphate, 555

Manning; pipe flow formula of, analysis of, 568

Manufacturing; reduction of wastes from, 532

Manuscripts; preparation of, and manual of style for authors, 473

Marianas Islands; ground water conditions on, 985

Maryland; organization and functioning of sanitary district in, 869

Massachusetts; treatment methods used in,

Mechanical gravity filters; see Filters

Media; B.G.B. and lauryl sulfate tryptose broth, 337

Medication; use of water supplies for, 834 Mercury; use of, in pressure gage, 1196

Metamorphic rocks; origin, types and waterbearing characteristics of, 740

Metaphosphate; see Phosphate; vitreous Meter rates; see Rates

Meter registration; importance of accuracy in, 540, 908, 1204

Meters; characteristics and purchase of, 905 current type; cold water; revision of tentative specifications for, 466

fire service type; cold water; specifications for, 173

maintenance of, 165, 168, 1204

rules governing, 1168, 1176 selection and sizing of, 24, 195, 165, 168, 909, 1204

value of standardizing, 470

Mexico; relation of, to resources of Colorado River, 946

Microbes; see Bacteria

Microbial fouling; correction of, in zeolite softener, 779

Micro-organisms; see Bacteria

Midland, Pa., construction of filtration plant at, 361

Military installations; U.S.; value of ground water studies to, 969

Military sanitation; aspects of, in Calcutta, India, 416

Military water supply; problems of, on Pacific islands, 979

Mineral content; see Hardness

Mining; coal strip; pollution of water supplies by, 751

Minnesota municipal supplies; numerical rating system for, 922, 928

Montana; municipal water works organization in, 783

Montgomery County, Md.; sanitary district organized in, 871

Mortar; see Cement-mortar

Municipal water uses; amount and purpose of, in Minnesota, 540

Municipal water works organization; methods of; in Illinois, 787 in Montana, 783

Municipalities; bond financing of improvements for, 333

taxes of, and support of public services, 325, 333

Mutual aid; New York program for, 520

#### N

Neosho River Basin; Kansas plan for development of, 673

Nevada; relation of, to resources of Colorado River, 946

New England; treatment methods used in, 65, 70, 77, 79, 84

New Hampshire; treatment methods used in, 84

New Haven, Conn.; treatment methods used in, 65

New Mexico; relation of, to resources of Colorado River, 946

New York; mutual aid program in, 520 Newark, N.J.; forestry practices on watershed of, 87

Niagara border; use of chlorine dioxide in plants on, 687

Nonrevenue-producing water; see also Unaccounted-for water

amount and purpose of, in Minnesota, 540 Nova Scotia; Halifax reservoir reconstruction, 503

Numerical rating system; use of, for Minnesota municipal supplies, 922, 928

## O

Oahu, T.H.; ground water conditions on, 979 Odor and taste control; see Taste and Odor Control

Office; appearance of, 1179 Ohio; bond financing in, 331

Ontario; Windsor water quality litigation, 529

Open S Opera

Dece

bus trea Organ

Ortho
Overd
of
effec

Owens ce Oxida us Oxyge

melect

Packin am Paint; tar Pearl

Pennsy mu Pensior r of

Personn pH; ca ciun effect c

upo

Phenols trol Philadel of, Phospha

zari tricale ti

use an si: Photome

anal genera Piezomet WA

Sup-

rat-

niza-

strict

'pose

neth-

ove-

ices,

de-

olo-

in,

d in,

used

of of

ter-

e in

Un-

540

ruc-

nne-

979

dor

on,

0

Open pit mining; coal; pollution of water supplies by, 751

Operation; see also Maintenance business principles in, 1176 treatment plant; costs of, 151

Organization; see also Municipal water works organization

importance of, in Indiana water works, 619 Ortho-tolidine; determination of chlorine residuals with, 209, 693

Overdraft; see also Ground water, depletion of

effects of, on wells, 33, 370

Owens Lake, Calif.; effect of litigation concerning, upon appropriation, 231 Oxidation; control of tastes and odors by,

using chlorine dioxide, 692 Oxygen; cost and manner of chemical removal of, 1121

electrometric determination of, 1124

## P

Packing; jute; sterilization of, by quaternary ammonium germicide, 1038 Paint; use of, to improve appearance of

tanks, 656 Pearl Harbor, T.H.; ground water condi-

tions at, 979
Pennsylvania; supply sources used by com-

munities in, 744
Pension and retirement; plan for; of Illinois

municipal utilities, 789
of Maryland sanitary district, 874

Personnel; see Employee

pH; calculation of, at saturation of tricalcium phosphate, 1090

effect of; upon bactericidal efficiency of chlorine dioxide, 566

upon zeolite exchange capacity, 1135
Phenols; see Pollution; Taste and odor control

Philadelphia; enlargement of water system of, 123

Phosphate; influence of, on zirconium-alizarin determination of fluorides, 52

tricalcium; calculation of pH of saturation for, 1090

vitreous; corrosion control with, 552, 778
porous concrete well cleaning with, 729
use and characteristics of, in water analysis, 344

Photometry; application of, to automatic analysis of residual chlorine, 693 general use of, in water analysis, 341

Piezometer; use of, in flow studies, 1192

Pipe flow; see Flow

reduction of, by slime growths, 1107

Pipelines; see also Distribution systems; Extensions

cathodic protection for, 1080

cleaning of, 775, 1107

control of slime growths in, 1107 cost of corrosion control for, 143

costs of corrosion in, 774, 1079, 1086

effects of lining in place, 1181 laying of, through traffic, 1115

reducing cost of, 630 rights of way for, 128

sterilization of, by quaternary ammonium germicide, 1038

Plumbing; supervision over, by Washington Suburban Sanitary District, 892

Plumbing fixtures; water demand of, 27, 196 Pollution; see also Fouling; Stream pollution; Wastes

coal strip mining as source of, 752, 757, 760, 768

control of, in Neosho River Basin in Kansas, 676

definition of, 537, 1014

density currents as source of, 358

ground water; effects of, 1016

necessity for legislation to prevent, 1003, 1010

state control of, 352, 532, 1011

Polymine D; main sterilization by, 1039

Polyphosphate; see Phosphate

Population; growth of; in relation to consumption, 297

sanitary district efforts to cope with, 876 U.S.; served by public water supplies, 773 Postwar planning; obstacles to fulfillment

of, 609 Power; hydroelectric; production of, from Colorado River, 959

sale of revenue bonds for, 1031 Power tools; maintenance of, 515

Practice; see Water works practice Pressure; improvement of, 717

loss of, in long pipelines, 1192 standards for, 23

Pressure filters; see Filters

Pressure zones; distribution system sampling coverage for, 1129

Prices; see Costs

Prince George's County, Md.; sanitary district organized in, 871

Prior appropriation; American rule of, governing water appropriation, 992

Priority; granting of, to water appropriated for domestic use, 999 Housing Expediter Regulation No. 7, 199 Production; comparison of, in water and other basic industries, 819, 1066

Professional organizations; use of, by engineers, for collective bargaining, 855

Public employees; see Employees; public Public relations; customer aspects of, 41, 49, 464

effect of rules and regulations upon, 1165 employee aspects of, 42, 43, 49 general public aspects of, 45, 49 sanitary district program of, 876 selection of sampling points to aid, 1130 training employees to improve, 464, 1177

value of improving, 1179 Public utilities board; Quebec; rate regulation by, 913

Publications; A.W.W.A.; report of, 262 style manual for authors, 473

Pumpage; reduction of, by stopping leaks, 715

Pumping; booster; to increase aqueduct capacity, 133

economic implementation of storage by, 643 reducing costs of, by use of elevated tanks, 644

review of practices of, 139

tests of, in studies of Wisconsin ground water, 376

Pumps; numerical rating system for evaluation of, 926, 928

Purchase; methods of, for meters, 907

Purchasing; testing and inspection as adjuncts to, 722

Purification; sec Treatment

## 0

Quality; ground water; improvement of, by sealing aquifers, 380

water; Windsor, Ont., litigation on, 529 Quaternary ammonium; main sterilization

by compound of, 1038 Quebec; history of treatment methods in, 797 rate regulation by public utilities board of,

#### R

Radial water collectors; construction and uses of, 742, 747

Radio; use of, in water utility communication, 384, 1097

Radio license; application for, 458, 1100

Rainfall; dependence upon, for island water supplies, 979

"Ranney" collector; see Radial water collector Rates; see also Charges

adjustment of, to cost levels, 819 equitable schedules of, 666, 1175

reduction of, 251

873, 877

regulation of, in Quebec, 913 relation of, to living costs, 115, 819

rules governing, 1168 setting of, to finance sanitary district

sewerage; see Sewerage charges

Rating system; numerical; for Minnesota municipal supplies, 922, 928

Reasonable use; American rule of, governing ground water appropriation, 991 Recharge; aquifer; artificial means for, 744

Reclamation; Bureau of; see Government, U.S.

measures taken for, in Colorado River basin, 949, 961

Records; meter maintenance, 172 Redemption; bond; provisions for, 1028 Reforestation; see Forestry

Refunds; granting of, on deposits for extensions, 258, 1068, 1071, 1076

Refuse; collection and disposal of, by Washington Suburban Sanitary District, 890 Registration; see Meter registration

Regulations; value of improving, 1165 Relining; pipe; see Lining; pipe

Remote and supervisory control; use of, to reduce labor costs, 864

Repair; reservoir; Halifax, N.S., high service reservoir, 503

Research; comparison of, in Sweden and America, 547

Reservoirs; control of silting in, 1225, 1229 Halifax, N.S.; reconstruction of, 503 impounding; economical use of, 637, 644 sampling coverage for, 1129 service; see Tanks

use of, for flood control in Kansas, 677 Washington Suburban Sanitary District; description of, 897

Residual; see Chlorination

Resin exchangers; classification of, as zeolite, 1133

Retirement; see Pension and Retirement Revenue bonds; see Bonds

Revenue-producing water; see Accountedfor water

Revenues; ratio of, to costs, 821

water; diverted to other uses, 609, 1177 Reynolds; pipe flow formula of, analysis of, 568

Richmond, Va.; water service standards used at, 23

Rights; correlative; American rule of, governing ground water appropriation, 992 Rights of way; types of, for pipelines, 128 Runo Rules

Dece

Rural 8 Roose

Rope Rubbi

Safety St. Poni Salari

Sale; Sales Salt d

Salt was Salt was Salts:

Sampli sy Sand; Sanitar

Sanitar Sanitat Inc San L

ins fanta ins Saturai cal

Scarsda at, Schened

Sedime Sedime Service

Service cati

u usir rules

Settling

WA

rict.

sota

ern-

744

nent,

iver

ten-

ash-

890

, to

erv-

and

229

644

ict;

eo-

ed-

177

of,

rds

ov-

992

128

Rocks; see Geologic formations

Runoff; study of, for flood control in Kansas, 675

Rules; value of improving, 1165

Rural areas; service of, by sanitary district, 869, 904

Roosevelt, Franklin D.; statement on right of public employees to strike, 844 Rope packing; see Jute packing

Rubbish; collection and disposal of, by Washington Suburban Sanitary District, 890

## S

Safety; accident prevention for improvement of, 459

St. Petersburg, Fla.; water utility communication by radio in, 384

Salaries; see Collective bargaining; Wages Sale; bond; provisions for, 1029

Sales representatives; South American, 409 Salt dosage; effect of, upon zeolite exchange capacity, 1139

Salt intrusion; problem of, on Pacific islands, 979

Salt water; intrusion of, in California ground waters, 428

Salts; see Hardness

Sampling; selection of points in distribution system for, 1128

Sand: production of, in wells, 380

Sanitary defects; numerical rating system for evaluation of, 923, 928

Sanitary district; description of, for suburban Washington, 869

Sanitation; military aspects of, in Calcutta, India, 416

San Luis Obispo, Calif.; water for Army installation at, 970

Manta Maria-Lompoc, Calif.; water for army installation at, 971

Saturation; calculation of pH of, for tricalcium phosphate, 1090

Scarsdale, N.Y.; system of accounts used at. 3

Schenectady, N.Y.; value of studies to ground water development at, 974

Sedimentary rocks; origin, types and waterbearing characteristics of, 740

Sedimentation; use of, for iron removal, 682 Service; water; relation of rules and regulations to, 1165

Service line fittings; underground; specifications for threads for, 1059

Services; design of; in Washington Suburban Sanitary District, 903 using standards, 24

rules governing, 1171 Settling; see Sedimentation Sewage; see Sewerage; Stream pollution control; Wastes

Sewer revenue bonds; sale of, 1031

Sewerage charges; equitable schedules of, 672

setting of, to finance sanitary district, 873, 877

Sewerage system; Washington Suburban Sanitary District, 889

Sewers; design of, in Washington Suburban Sanitary District, 901

ground water pollution caused by failure to make use of, 1005

Silica; effect of, upon zeolite exchange capacity, 1135, 1141

Silting; problem of, in Colorado River basin,

reservoir; control of, 1225, 1229

Skimming tunnels; use of, for tapping shallow ground water lenses, 987

Slakers; lime; clinker remover for, 467 Slime; appearance of, in pipelines, 1183

control of, in pipelines, 1107 Sodium; effect of, upon zeolite exchange capacity, 1135

Sodium metabisulfite; de-chlorination by,

Sodium phosphate: see Phosphate; vitreous Sodium sulfite; use of, for oxygen fixation, 1121

Softener; zeolite; microbial fouling of, 779 base-exchange; see Zeolite

Softening; see also Hardness; Treatment

base-exchange; see Zeolite

costs of, 147
extent, methods and relation of, to corrosion control, 777

solubility of phosphates for, 1090

Soil Conservation Service; see Government; U.S.

Solubility; calculation of, for tricalcium phosphate, 1090

South America; northern; water supply development in, 397, 411

Southwest; relation of, to resources of Colorado River, 945

Specifications; A.W.W.A.; standard; for coal-tar enamel protective coatings for steel water pipe 30 in. and over; erratum to Sixth and Seventh Printings of, 542

tentative; for current type cold water meters; revision of, 466

use of, in purchasing materials and equipment, 722

Spectral transmittancy; significance of, in water analysis, 347

Spectrophotometer; use and characteristics of, in water analysis, 345

D

To

To

To

Tr

Tr

Tr

Tra

Tra

Tra

Tre

C

h

11

Tre

Tre

Tru

Tut

CO

m

Tur

TV.

Typ

ra

Una

re

SU

Und

Unio

Unic

lin

sta

Di

Fo

Ge

go

Pu

Unit

Spoil banks; coal; pollution of water supplies by, 752

Sponges; fresh water; control of growths of, 1107

Springs; types and water capacity of, 742
Standard Methods for the Examination of
Water and Sewage; errata to Ninth
Edition of, 528

requirements and usefulness of, 735 sampling techniques recommended by, 1131 sponsorship of, 1175

Standardization; value of; for hydrants, valves and meters, 470 for rules and regulations, 1168

Standards; Drinking Water; Canadian; requirements and usefulness of, 736
U.S.; requirements and usefulness of,

734 sampling requirements of, 1128

water service, value and use of, 23 Standpipes; see also Tanks

substitution of, for elevated tanks, 649 State; see also Interstate

State regulation; see Legislation, state State sanitary engineers; reports of construction lag by, 610

States; financial relation of, to municipalities, 325

Sterilization; see also Chloramination; Chlorination

main; by quarternary ammonium germicide, 1038

use of chlorine dioxide for, 561

Storage; depletion of, in Pacific island Ghyben-Herzberg lenses, 983 determining amount required, 646

economical use of, 637, 644 sanitary district facilities for, 894, 899

Storm drainage; sanitary district provisions for, 893, 902

Strata; see Geologic formations; Ground water

Stream pollution; see Pollution; Wastes Street grades; sanitary district control over, 875

Strikes; legislation forbidding, 844

Strip mining; coal; pollution of water supplies by, 751

Style; manual of, for authors, 473

Subterranean river; myth of, at Schenectady, N.Y., 974

Suburban Washington; sanitary district of, 869

Sulfates; concentration of, as index of coal strip mining pollution, 766

pollution by, as result of coal strip mining, 752, 763

Sulfite; sodium; use of, for oxygen fixation, 1121

Sulfur dioxide; de-chlorination by, 1238, 1241

Super-chlorination; practice of, 1237, 1241 Supervisors; improvement required in, 864 Supervisory control; electrical; use of, to reduce labor costs, 864

Supply sources; see also Ground water; Surface supplies

Pennsylvania; number and type of, 744 Surface supplies; see also Supply sources Illinois; development of, 661

Surface wash; see Filter wash system Surplus funds; water works; use of, for other municipal services, 609, 1177 Sweden; water works practice in, compared

to America, 547

#### T

Table; water; see Ground water; Water table

Tables; hydraulic; for analysis of pipe flow formulas in terms of Darcy f, 572

Tanks; cathodic protection of, 657 design and appearance of, 651 determining capacity of, 646 economical use of, 637, 644 reducing cost of, 634 sampling water from, 1129

Taste and odor control; chlorine dioxide for, 688, 691

super-chlorination for, 1237, 1241

Tate process; use of, for lining small pipelines in place, 775 Tax; transportation; exemption from, 560

Taxes; see also Surplus funds municipal; and support of public services, 325, 333

use of, for financing sanitary district, 872 Teeth; fluorides to prevent decay of, 835

Teeth; fluorides to prevent decay of, 835
Telemetering; radio facilities for, 1098

Temperature; effect of; upon water samples, 1131 upon zeolite exchange capacity, 1141

Tennessee; stream pollution control in, 352 Tensile strength; measurement of, in cement linings, 1184

Tests; aqueduct and booster pump, 136 hydrostatic, 1118

materials and equipment; procedure for, and inspection of, 722

Threads; underground service line; specifications for, 1059

Titration; ortho-tolidine method of, for chlorine residuals, 209

WA

ation.

1238.

1241

864

f, to

ater;

for

ared

ater

flow

xide

ipe-

50

ices,

872

am-

352

nent

for,

eci-

for

44

S

Tools; power; maintenance of, 515

Topography; difficulties with water storage caused by, 894

Towers; water; see Tanks Training; personnel, 47

Transmission; radio; see Radio

Transmittance; filter; significance of, in water analysis, 347

Transmittancy; solution; significance of, in water analysis, 347

Transportation; amount and cost of, in water and other industries, 819, 1066 Transportation tax; exemption from, 560

Transportation tax; exemption from, 560
Treatment; see also Corrosion control; Filtration; Softening; Sterilization chemical; value and hazards of, 834

history of methods of, in Quebec, 797 methods of; in New England, 65, 70, 77, 79, 84

used for Wisconsin ground water, 95 Treatment plants; see Water works

Trees; see Forestry
Trucks; maintenance of, 515

Tuberculation; see also Corrosion costs of, 774

measurement of, as corrosion index, 220 Turbidity; measurement of, as index of erosion control, 1232

TVA; co-operation of, in Tennessee stream pollution studies, 352

Typhoid fever; effect of epidemic of, upon Quebec treatment methods, 797 rate of, in Quebec, 801

## H

Unaccounted-for water; see also Accounted-for water; Leakage

reduction of, 1204

survey of, in Minnesota water plants, 539 Underground water; see Ground water Unionization; influence of, upon personnel relations, 42

Unions; growth of, in America, 855 limitations of, in bargaining with public employers, 844

status of engineers in, 858

United States; water works practice in, compared to Sweden, 547

Drinking Water Standards; requirements and usefulness of, 734

Forest Service; research by, 444

Geological Survey; see also Government; U.S.

studies in Wisconsin ground water, 369 government agencies; see Government, U.S.

Public Health Service; co-operation of, in Tennessee pollution studies, 352

Use; beneficial; principles of, governing ground water appropriation, 997

fire protection charges based upon, 627 reasonable; American rule of, governing ground water appropriation, 991

Utah; relation of, to resources of Colorado River, 946

Utilities; public; Quebec board for rate regulation of, 913

underground; control of, by sanitary district, 877

Utility Radio Service; see Radio

### V

Vacuum de-aeration; possible use of, for corrosion control, 1121

Valves; value of standardizing, 470

Vehicles; maintenance of, 515 Velocity; water; studies of, 1191

Venezuela; water supply development in, 411 Virginia; legislation and efforts to reduce

stream pollution in, 532
Volcanic action; effect of, on island ground water supplies, 979

## W

Wages; see also Collective bargaining

effect of, upon water rates, 116, 822 increases in, as incentive to improvement

of methods, 863 Wagner Act; status of engineers under, 858

Walkie-talkie; see Radio
War; effect of, on water works operating
costs, 821

Wash; see Filter wash system

Washington, D.C.; sanitary district cooperation with, 874 system expansion in, 291

Washington Suburban Sanitary District; description of, 869

Waste; elimination of, by leakage and meter surveys, 157

extent of, in Minnesota water plants, 539 Wastes; see also Sewerage; Stream Pollu-

tion Control industrial; ground water pollution from, 1005, 1011

reducing stream pollution from, 532, 1018

Water; see Ground water; Supply sources; Surface supplies

corrosive; see Corrosion

legal definitions of, 996, 1014 production and cost of, compared to other basic commodities, 819, 1066

AD

AL

AL

AN

AR

AR

AST

AU

BAR

BAR

BEC

BEC

BEN

BEN

BLA

BLA BLA Bow Brov

Brov

CAM

- Water costs; see Commodity costs
- Water level; see Ground water; Water table
- Waterproofing; methods of, for concrete, 253 Water revenue bonds; see Bonds; revenue Watersheds; control of soil erosion on, 1224,
  - development of New Cherry Valley, for West Penn Water Co., Pa., supply, 771
  - forestation practices on, 455, 1233 patrolling of, use of radio for, 1098 research on, 444
- Water supply; see also Development military aspects of, and sanitation, in Calcutta, 416
- Water table; see also Ground water effect of level of, upon supplies, 32, 370, 381
- Water towers; see Tanks
- Water works; see also Construction
  - Illinois; history of development of, 659 per capita amount and cost of, required for services, 774
  - Washington Suburban Sanitary District, 883, 895
- Water works organization; see Municipal water works organization
- Water works practice; see also Administration, Treatment
  - characteristics of, in northern South America, 399, 411
  - committee report on, 265
  - communication of, in Sweden and America,
  - improvement required in, 863
- Welding; influence of, upon design of tanks,
  - test of, in pipeline joints, 1118

- Wells; see also Ground water; Radial water collector
- capacity improvement by cleaning, 380 concrete; chemical cleaning of, 729
- development of, for Army installations in U.S., 972
- drilling and development of, at Ambridge, Pa., 750
- Illinois; history of development of, 659 life of, 32
- observation; use of, in Wisconsin, 373 review of types and capacities, 743
- West Penn Water Co., Pa.; construction of new supply for, 770
- damage to old supply of, 752, 756, 760, 770 Wholesale water; rules governing, 1173
- Williams-Hazen coefficient; see Flow; pipe Windsor, Ont.; litigation on water quality, 529
- Wisconsin; ground water supplies in, 93, 369 Worker; see Employee; Labor
- Wyoming; relation of, to resources of Colorado River, 946

## Y

Yuma, Ariz.; reconditioning water system of, 245

## Z

- Zeolite; synthetic siliceous; operating characteristics of, 1133
- synthetic siliceous; regeneration of, 1147 Zeolite softener; microbial fouling of, 779,
- Zirconium-alizarin determination of fluorides; influence of phosphates upon, 52
- Zoning; distribution system; for sampling coverage, 1128

# Author Index

ADAMSON, JOHN H., Jr., review of ground water collection and development methods, 739

WA water 80

ridge.

659

73

uction

0, 770

pipe

uality,

3, 369

Colo-

ystem

char-

147

, 779,

fluo-

on, 52

npling

ALEXANDER, LOUIS J., discussion—problems in cathodic protection, 1086

ALMQUIST, FREDERICK O. A., water treatment in Connecticut, 70

Andrews, G. N., chemical cleaning of porous concrete wells, 729

ARCHAMBAULT, JACQUES, see McCRADY, MACHARVEY

Arnold, Gerald E., business principles in water works operation, 1176

ASTON, ROYDEN N., chlorine dioxide use in plants on the Niagara border, 687

AULTMAN, WILLIAM W., lime and lime-soda sludge disposal, 1211

Banks, William G., tests on steel pipes lined in place, 1181

BARBEE, EDWIN W., tuberculation measurement as an index of corrosion and corrosion control, 220

BECHERT, CHARLES H., safeguarding Indiana's water resources, 792

Beck, Joseph A., discussion—effects of coal strip mining upon water supplies, 756

Benedict, Sydney J., laying a 36-in. main through traffic, 1115

Bennison, E. W., see Harding, James C. Black, A. P., basic concepts in ground water law, 989

BLACKBURN, SCHUYLER C., enlargement of the Baltimore water supply system, 119

Blanchard, Francis B., erosion control in East Bay watersheds, 1229

BOWERS, A. E., see STREICHER, L.

Brown, Kenneth W., selection and control of sampling points in distribution systems, 1128

Brownell, O. E., numerical rating system for municipal water supplies, 922

BUNKER, GEORGE C., water supply development in the northern republics of South America, 397

CADY, H. R., developments in pumping practices, 139

Campbell, John T., new West Penn water co. supply, 770

CARR, J. ARTHUR, see HARDING, JAMES C. CASTEEL, STEPHEN C., selecting, training and

rating personnel, 47

CHAMBERLIN, NOEL S., discussion—orthotolidine titration procedure for measuring chlorine residuals, 218

Chase, Douglas E., installation of a radial water collector, 747

Chase, E. Sherman, discussion—numerical rating system for municipal water supplies, 928

CHATTERS, CARL H., reduction of municipal taxes and the support of public services, 325

CHURCHILL, M. A., effect of density currents upon raw water quality, 357

Connell, C. H., ortho-tolidine titration procedure for measuring chlorine residuals, 209

Damiano, Adolph, radio service in water systems, 1097

DANDRIDGE, ERNEST F., see WEIR, W. VICTOR

Davis, Daniel E., discussion—operating characteristics of synthetic siliceous zeolite, 1151

Dean, George W., watersheds and reforestation, 455

DeBerard, W. W., see Hagedorn, Harry P. Derby, Ray L., control of slime growth in transmission lines, 1107

Devendorf, Earl, mutual aid program for peacetime, 520

Doll, Byron E., formulating legislation to protect ground water from pollution, 1003

Dolson, Frank E., problems in cathodic protection, 1079

Doull, R. M. & Kline, J. D., reconstruction of the Halifax high service reservoir, 503 Drescher, W. J., see Foley, F. C.

Eddy, Justus B., underground leakage work in Chicago, 713

EKSTROM, C. G., Yuma and the Colorado river, 245

EVATT, WILLIAM S., financing improvements by revenue or general obligation bonds, 331

De

KN

LAB

LAB

LAU

LEA

LEA

LIE

MAT

MAX

McC

McC

McI

MEL

MER

MILI

Mor

dis

Mor:

dis

Mosi

MUR

MUR

MYEI

Faber, Harry A., contemporary chlorination practices, 200

a theory of taste and odor reduction by chlorine dioxide, 691

FARRELL, R. P., stream pollution control in Tennessee, 352

FINCH, LEWIS S., see WEIR, W. VICTOR FLAA, INGWALD E. & RENSHAW, WILLIAM C., rights of way for pipelines, 128

Foley, F. C., Drescher, W. J. & Hendrickson, G. E., ground water studies in Wisconsin, 369

FRAZIER, RUSSELI. E., see TAYLOR, DEAN M.

GALLAHER, WILLIAM U. & WECKWERTH, H. F., some economic aspects of softening, 147

Gedge, F. G., office procedure in a small water works, 543

GEIGER, J. C., discussion—should public water supplies be used for mass medication?, 841

Gelston, W. R., municipal water works organization in Illinois, 787

GOUDEY, RAY F., developing standards for the protection of ground water, 1010

Grant, Burton S., erosion control in Los Angeles watersheds, 1224

GRAY, S. C. & Moses, D. V., an automatic residual chlorine analyzer, 693

Green, Jerome & Holmes, J. A., calculation of the pH of saturation of tricalcium phosphate, 1090

Green, Sterling S., engineers' organizations for collective bargaining, 855

GRIFFITHS, JAMES G., discussion—reducing unaccounted-for water, 1209

Gustafson, G. V., discussion—reducing unaccounted-for water, 1207

HAGEDORN, HARRY P. & DEBERARD, W. W., testing and inspection of materials and equipment, 722

HALE, J. ELLIOTT, water treatment in Maine,

HALL, HARRY R., disposal of wastes from purification plants, 1219

---- & Shaw, Harry B., Washington suburban sanitary district, 869

HANEY, PAUL D., brine disposal from sodium zeolite softeners, 1215

HARDING, JAMES C.; BENNISON, E. W.; CARR, J. ARTHUR; HENDERSON, ANGUS D.; LUCE, ARTHUR T.; MILLIS JOHN B.; ROMINE, HARRISON E. & SMITH, LEON A., panel discussion—useful life of water wells, 32 HATCHER, MELVIN P., see also WEIR, W. VICTOR

water works rules and regulations, 1165 HAYDOCK, CHARLES, reducing unaccountedfor water, 1204

HEDGEPETH, L. L., industrial use of streams, 532

Heffelfinger, Donald D., financing main extensions, 257

Heilman, John M., forest management for Newark, 87

HENDERSON, ANGUS D., see HARDING, JAMES C.

HENDRICKSON, G. E., see FOLEY, F. C.

HILL, KENNETH V., treatment plant operating costs, 151

Holloway, H. F., new filtration plant at Midland, Pa., 361

HOLMES, J. A., see GREEN, JEROME

Hoskinson, Carl M., see Weir, W. Victor Howard, Norman J., super-chlorination and de-chlorination, 1241

Howell, A. E., clinker remover for lime slakers, 467

Howland, Warren E., finding the low point on the cost curve, 630

Howson, Louis R., a review of Illinois water development, 659

adjusting rate structures to rising cost levels, 819

Hudson, Leo, analysis of pipe flow formulas in terms of the Darcy function f, 568

HYATT, EDWARD, water development plans in California, 430

INGOLS, R. S., see RIDENOUR, G. M.

Jacobson, E. E., employee training and customer relations, 464

JACOBSON, S. & WELLINGTON, M. S., chlorination experiences with surface supplies, 65

JENSEN, OTTO K., organization and financing in Indiana, 619

Johnson, Arthur L., municipal water works organization in Montana, 783

Johnson, Dewey W., losses in distribution systems, 157

JORDAN, HARRY E., what has happened to water works construction?, 607

costs of corrosion to the water industry,

Kear, Carl, discussion—effects of coal strip mining upon water supplies, 768

Kendall, Nathaniel J., waterproofing concrete structures, 253

WWA

EIR, W.

1165

ounted-

treams,

g main

ient for

JAMES

operat-

lant at

VICTOR

ion and

w point

Illinois

ig cost

ormulas

, 568

t plans

nd cus-

ilorina-

olies, 65

financ-

works

ribution

ened to

idustry,

ng con-

KLINE, J. D., see DOULL, R. M.

KNUDSEN, H. A., booster pumping on a large closed aqueduct, 133

LADUE, WENDELL R., significance of legislation forbidding strikes by public employees, 844

discussion-tests on steel pipelines lined in place, 1188

LAFRENIÈRE, T. J., water treatment practice in Quebec, 797

LARIVIÈRE, A., regulation of water rates in Quebec, 913

LAUTER, CARL J., de-chlorination at the Washington aqueduct, 1237

LEACH, DONALD A., progress in the design of elevated steel tanks, 651

LEARNED, ALBERT P., equitable schedules of water rates, 666

LIEBERMAN, JOSEPH A., water resource and watershed management research in the Southeast, 443

LUCE, ARTHUR T., see HARDING, JAMES C. or lime

> MATHEWS, EVERETT R., iron and manganese removal by free residual chlorination,

> MAXWELL, DONALD H., planning capacity for elevated storage tanks, 644

> McCarthy, Joseph A., water treatment in Massachusetts, 79

> McCrady, Mac Harvey & Archambault, JACQUES, laboratory procedures and water standards, 734

> McDonald, Norman G., economics of water storage, 637

> Mellon, M. G., colorimetry and photometry in water analysis, 341

> MERZ, H. S., Illinois utility pension plan, 789 MILLIS, JOHN B., see HARDING, JAMES C.

MORRIS, SAMUEL B., the Colorado riverthe Southwest's greatest natural resource, 945

discussion-basic concepts in ground water law, 1002

MORSE, W. C., discussion-should public water supplies be used for mass medication?, 842

discussion-radio service in water systems, 1104

Moses, D. V., see Gray, S. C.

MURDOCH, JOHN H., JR., see WEIR, W. VICTOR

upgrading the water works industry, 863 al strip MURDOCH, WILLIAM J., discussion—effects of coal strip mining upon water supplies,

> MYERS, HENRY C., the role of algae in corrosion, 322

NEWKIRK, SAMUEL F., JR., selection of customer service meters, 195

NEWSOM, REEVES, simplified system of accounts for average municipal water works, 1

NILES, PHILIP B., aspects of public relations -relations with customers, 41

OGDEN, WILLIAM H., aspects of public relations—relations with employees, 42

OHRT, FREDERICK, water development and salt water intrusion on Pacific Islands,

PEARSON, H. E., see STREICHER, L.

PIPER, ARTHUR M., discussion—ground water —a neglected natural resource, 977

PIRNIE, MALCOLM & SAWYER, ROBERT W., ground water-a neglected natural resource, 968

Pye, David J., chemical fixation of oxygen,

RENSHAW, WILLIAM C., see FLAA, INGWALD

RICE, OWEN, corrosion control with Calgon, 552

RIDENOUR, G. M. & INGOLS, R. S., bactericidal properties of chlorine dioxide, 561

RIDGELY, RAYMOND G., radio communication for water works, 384

ROBINSON, STEPHEN S., legislation for revenue bond financing, 1021

ROMINE, HARRISON E., see HARDING, JAMES C.

SAWYER, ROBERT W., see PIRNIE, MALCOLM SCHEIN, HARRY L., comparative study of Swedish and American water treatment practices, 547

SCHMITT, EDWIN A. & VOIGT, OTTO D., expansion of Columbia water system, 291

SCHMITT, HERBERT C., repairing a surface wash system, 235

SCHNEIDER, W. R., economics of pipeline protection, 143

Scobey, Fred C., equipment and procedure for long line hydraulic studies, 1191

SHANE, MIRIAM S., studies on false confirmed test using B.G.B. and comparison studies on lauryl sulfate tryptose broth as a presumptive medium, 337

SHAW, HARRY B., see HALL, HARRY R.

SLONE, M. A., discussion—new filtration plant at Midland, Pa., 365

SMITH, LEON A., see HARDING, JAMES C.

SMITH, MARSDEN C., experiences with standards for water services, 23

A

A

A

A

Ai

Al

All

All

Al

Alı

Alt

An

Ana

Ani

Anı

Ant App Arc Ark L Arn Arte Arti Asp Ato Aus br N Su Ta Wa Aust Auto

C

- SMRHA, R. V., Kansas plan for Neosho river basin development, 673
- SNYDER, RAYMOND H., effects of coal strip mining upon water supplies, 751
- Sopp, George C., water meters earn their keep, 905
- Sotier, Alfred L. & Ward, Harry W., quaternary ammonium germicidal treatment for jute-packed water mains, 1038
- STEWART, ELON P., aspects of public relations—relations with the general public, 45
- STREICHER, L., PEARSON, H. E. & BOWERS, A. E., operating characteristics of synthetic siliceous zeolite, 1133
- TAGGART, EDWARD C., new water field development at Ambridge, Pa., 750
- TAYLOR, DEAN M. & FRAZIER, RUSSELL E., influence of phosphates on zirconiumalizarin method of fluoride determination, 52
- TAYLOR, ELBERT J., water works extension problems in 1946, 57
  - water works improvements for Philadelphia, 123
- Teal, D. C., sanitation for the American forces in Calcutta, 416
- THOMPSON, LEONARD N., recent revenue bond legislation, 1032
- Tolles, Frank C., relation of water rates to living costs, 115
- TRAGER, LEONARD W., water treatment in New Hampshire, 84
- VAN DORP, GEORGE J., value of hydrant, valve and meter standardization, 470

- VAN NORMAN, D. M., care of power tools and equipment, 515
- VEATCH, N. T., discussion—water works extension problems in 1946, 61
- VILORIA LUGO, M., water supply activities in Venezuela, 411
- Voigt, Otto D., see Schmitt, Edwin A.
- WALDO, CORNELIUS T., effect of litigation on water appropriation in California, 231
- WARD, HARRY W., see Sotier, Alfred L. Webb, Harold F., cause and prevention of
- accidents, 459
  WECKWERTH, H. F., see GALLAHER, WILLIAM U.
- Weir, W. Victor; Hatcher, Melvin P.; Murdoch, John H., Jr.; Dandridge, Ernest F.; Finch, Lewis S. & Hoskinson, Carl M., panel discussion—water main extension policy, 1067
- WELLINGTON, M. S., see JACOBSON, S.
- Wenrick, H. P., well cleaning and rehabilitation, 380
- WILLIAMS, G. L., program for routine testing and maintenance of meters, 168
- WILLIAMS, W. L., microbial fouling of zeolite water softeners, 779
- Wilson, Carl, geochemical alteration in ground waters of the Los Angeles coastal plain, 423
- Wirth, Harvey E., ground water supplies & Wisconsin, 93
- WITHERSPOON, FRED R., methods of fixing public fire protection charges, 623
- WOLMAN, ABEL, should public water supplies be used for mass medication?, 834

# **Abstract Index**

All subjects and page numbers in boldface type are the first pages of topic sections or of a number of abstracts on the particular subject.

Accounting; punched card, 805 Acid wastes; neutralization of, 492, 811 Acid-proof coatings; use of, for corrosion control, 944

Activated carbon; survey on use of, 491 Administration, 802

WWA

rks ex-

NA.

tion on

ED L.

, WIL-

IN P.:

DRIDGE

OSKIN-

-water

ind re-

ne test-

ling di

tion i

Angele

plies o

fixing

supplie

3

834

168

S.

Aeration; see also Oxygen; application of reduction of stream pollution by, 288, 1056 Africa; north; water supply in, 494, 499 south; water supply in, 494

Algiers; water supply in, 494 Alkalinity; determination of, 1162

Allergy; importance of mineral content of water to, 192

Alpha-naphthylamine method; determination of nitrites by, 1163

Aluminum; anodes of, for cathodic protection, 1058

Aluminum pipe; corrosion of, 606

Ammonia; use of nitrifying filter for oxidation of, 812

Analysis; bacteriological, 101 chemical; nomograph for equivalents, 933

Anions; determination of, 1163 Annual reports, 110, 600, 1152 Anthracite; filtration with, 811

Appropriation of water; litigation on, 105 Arctic water supplies, 1053

Arkansas; Fort Smith annual report, 110 Little Rock annual report, 600, 1152 Armenia; water supply in, 1055

Artesian water; see Ground water Artificial recharge; see Recharge, artificial Asphalt; use of, as pipe lining material, 1158 Atomic bombing; effects of, on Japanese

water supplies, 1054 Australia; Brisbane annual report, 603 bromine in saline waters of, 1053

New South Wales; distribution of fluorine in waters of, 934

surface supplies in, 281

Tasmania; fluorine in waters of, 934 water supply in, 281, 494, 495, 496

Austria; Graz; water supply expansion in, 1053

Automatic control; use of, 1055, 1162

Bacteria; coliform, in paper mills, 102 contamination traced by use of, 101 death curves for, 101 examination of water for, 101

growth of, in pipe jointing materials,

marine; action of, 710

spontaneous combustion induced by action of, 1050

sulfate-reducing; aid given to corrosion of pipe by, 943

Bactericidal agents; see also Chlorination; Cysticidal agents; Ovicidal agent; Sterilization; Virucidal agent

chloramine; influence of pH and temperature upon action of, 101

effects of, upon the bacterial cell, 708 electrolytic hypochlorite, 1046

filtration; slow sand, 102

iodine, 1047 light, 290

quaternary ammonium compounds, 709

short-wave radiation, 709 silver compound, 103

Bacteriology, 101, 706

Barium; determination of, 1163 Bentonite; clarification with, 492

Bituminous coatings, 1058, 1158 Boiler feed water; sampling of, 388, 1163

testing for oxygen in, 1163 treatment of, 388, 389, 390, 940, 941, 942,

Boilers; cleaning of, 389, 390

Boilers and Feed Water, 388, 940

Bombing; atomic; effects of, on Japanese water supplies, 1054

Breakage; hydrant; liability for, 806

Break-point; see Chlorination, free residual British Columbia; Vancouver; discontinuance of chlorination in, 492

Bromide; determination of, 596

Bromine; content of, in saline waters of Australia, 1053

Burning; see Combustion

De

Da

Da

DD

Den

Den

Des

Dia

Dise

W

Diss

Dist

Dist

Dist

Dist

Dith

Divi

Drain

Drill

Drou

Egyp

Elect

Elect

Elect

Elect

Elect

Electi

Emple

ti

qua

Engla

Erosio

Filter

anth

auto

com

de-a

desig

diato

nitri

rebu

slow

g

we

Cacotheline: application of, in volumetric analysis, 597

Calcium; determination of, 110, 1163 Calcium carbonate; solubility of, 108

Calcium-sequestering value of phosphate water conditioners in, 597

California; Long Beach annual report, 110 Los Angeles; artificial recharge in, 929 ground water pollution control in, 929

Matilija Dam; construction of, 816 Pasadena annual report, 110, 601 Santa Barbara; doubling water storage of,

water appropriation litigation in, 105 water supply from snowfall in, 937

Caliper; internal tubing, measurement of corrosion with, 606

Canadian Water Supplies-General, 492

Canadian water works; see entries under particular provinces

Canals; see Irrigation

Carbon; activated; survey on use of, 491 Carbon dioxide; microdetermination of, 933

Carries; dental; see Fluorine Carry-over; in boilers, 941

Cathodic protection, 605, 606, 943, 1058

Cavitation; supersonic waves as cause of, 1156 pump, 943

Cercariae; removal of, by filtration, 811

Charges; sewerage, 802, 803 Charges; water; see Rates

Chemical Analysis, 595, 933, 1162 Chemical treatment; safety of, 489

Chloramine; influence of pH and temperature upon bactericidal action of, 101

Chloride of lime; sterilization with, 286 Chlorides; determination of, 597, 935

Chlorination; break-point, 1046

cannery water, 712 cysticidal action of, 1048 discontinuance of, 492

effect of, upon filtration, 286

free residual, 1046 orders to begin, 106, 107 ovicidal action of, 287

taste and odor control with, 285 virucidal action of, 192

Chlorine; see Chlorination, Sterilization

Cholera; water-borne, 703
Chromate: treatment of waste waters or

Chromate; treatment of waste waters containing, 288

Chromium; amount of, in waters, 936 Clarification; bentonite for, 492 Coagulation; use of lime for, 108

Coal tar; use of, to inhibit cracking and stress corrosion, 1058

Coatings; pipe, 604, 944, 1058, 1158

Cobalt; determination and amount of, 935 Coliform organisms; culturing of, 706

Collector; see Radial water collector Colorado; Denver annual report, 110, 1152 Colorado River basin; development in, 940

Colorimetric determinations, 595 Columbia; water supply in, 496

Combustion; mechanics of, 1049 spontaneous, 1050

Connecticut; Hartford annual report, 111, 601

Construction; water works; see Canadian, Foreign Water Supplies; Water development; also entries under particular countries, states and provinces

Contamination; see Pollution

Contracts; public; regulations governing, 104 Cooling water; preparation of, 710 protection against contamination of, 1057 radioactive tracing of, 710 softening of, 109 studies of, 389

Copper; determination of, 936 influence of, upon iron removal, 808, 809

Copper tubes; studies of, 944 Corrosion, 604, 943, 1058

measurement of, with internal tubing caliber, 606

measurement of pits caused by, in boilers, 942

pipe; aid given to, by sulfate-reducing bacteria, 943

Corrosion control; see also Cathodic protection, Inhibitors

acid-proof coating for, 944 electrolysis control for, 944 inhibitors for, 944 oil recovery from sands for, 1156

oils for, 604 phosphates for, 944

Costs; construction, 805

water; see also Annual Reports in Ontario, 804

Cracking; prevention of, and stress corresion, 1058

Culturing; bacteriological; techniques of 706, 707

Current; control of, to prevent electrolysis of pipe, 944

Cyanides; determination of, 933 Cyprus; water supply in, 1055

Cysticidal agents; see also Bactericidal agents behavior of, 286, 1047, 1048

Dairy wastes; disposal of, 1057 Damage; flood; liability for, 806 f. 935 06

WWA

1152 in, 940

rt, 111,

anadian. develerticular

ing, 104 of, 1057

308, 809

ng caliboilers.

educing protec-

COTTOies of

trolysis

ericidal

automatic control of, 1055 composition of slime in, 811 de-aeration with, 811 design and operation of, 813 diatomaceous earth; efficiency of, 810 nitrifying; use of, 812

anthracite as medium in, 811

rebuilding of, 812 slow sand; chemistry and biology of, 813

Dams; see also Reservoirs; River valley

construction of, 814, 816, 817 failures of, 815

gravity; stress distribution in, 814 repair of, 818

site investigations for, 817 stress distribution in, 814 Dams and Reservoirs, 814

DDT; insecticide effectiveness and toxicity of, 704, 705

De-aeration; filtration for, 811 Denmark; iodine in waters of, 934 Dental caries; see Fluorine

Design; filter; aspects of, 813 Diatomaceous earth; filtration with, 810, 811 Disease; see also Allergy; Typhoid fever water-borne, 191, 192

Dissolved oxygen; see Oxygen

Distillation; use of, for rendering sea water potable, 1155

Distribution system; effect of; upon pumping practice, 393 upon effective fire-fighting, 1051, 1052

Distribution Systems, 391, 1156 District of Columbia; see Potomac River

Basin Com. Dithizone method; use of, for water analysis, 935, 936

Divining rod, tests with, 936, 937 Drains; cleaning of, 712

Drilling; see also Wells well, 194, 932 Droughts; studies of, 281

Egypt; water supply in, 499 Electrical control; see Automatic control Electrical purification; method of, 489

Electrolysis; control of, 944 Electronic; see also Electrical

Electronic determination of dissolved oxygen, 491

Electroplating; pipe, 604

Filters; see also Filtration

Employment; conditions of, in public utilities, 804

qualifications and tests for, of welders, 806 England; see Great Britain Erosion control, 938, 939

Filtration, 810

see also Filters

neutralization of acid waters by, 811

removal of cysts by, 286

slow sand; removal of bacteria by, 102 Finances; see also Accounting; Charges; Costs; Rates; Wages

regulation of, in Argentina, 805

Fire; loss caused by, 1051

Fire-fighting; research on, and most effective use of water for, 1049

Fire hydrants; 1052, 1156 Fire Protection, 1049

Fish; toxicity of wastes to, 288 Floods; control of, 931 liability for damage from, 806 study of, 939

Flow; pipe; formula for, 387 river; gaging of, 280, 939 Flume meter; Venturi, 385

Fluorine; adsorption of, by tricalcium phosphate, 934

determination of, 933, 1163 distribution of, in surface waters, 934

removal of, 490 use and effect of, in combating dental caries, 701, 702

Foreign Water Supplies-General, 494,

Foreign water works; see entries under particular countries

Forestation; practice of, on watersheds, 283 Freezing; leak repair employing, 1158 rendering sea water potable by, 490, 1155

Frost; penetration of, 281 protection against, 393

Gaging; river flow, 280, 939

Galvanic corrosion; prevention of, 605 Geology; see also Ground water

influence of, on dam construction, 814 relation of, to ground water in Honolulu area, 929

Germany; evidences of pollution in water supplies, 1053

Germicidal agents; see Bactericidal agents Ghyben-Herzberg lens, 929

Great Britain; Claerwen Dam; construction

Chew Stoke Reservoir; design of, 817 Coventry; nitrifying filter of, 812

ground water in, 194 London; construction in, 499

flood in, 939 pumps for, 1159

Shrewsbury; water supply in, 1054 water development in, 1054

Deci

Man

res

Medi

Meta

Mete

Meth

Mich

De

Wy

Midd

Moly

Mont

Mosq

11

Vebra

Vethe

56

gro

Wit

Neutr

New '

fo

of

Cor

Elm

Lon

Mt.

New 2

11

Clut

Vickel

Nitrat

Vitrify

Vitrite

Nitrog

North

cean

dors;

Ohio;

study

Dil: re

Oil fiel

Ontario

Coch

Ham

King

Kitch

ge

CO

in

an

S

1

Ground water; see also Wells artificial recharge of, 931 California, 929 flow of, 929 Great Britain, 194 Hawaii, 929 Kansas, 193 location of; by divining rod, 936, 937 methods for, 936, 937 Louisiana, 193 Nebraska, 193 Netherlands, 194 New York, 930, 931, 932 Queensland, 933 Sahara Desert, 932 Texas, 932 Guam; water supply in, 497

determination of, 110 Hawaii; Honolulu annual report, 114, 603 Honolulu area; ground water and geology of, 929 Health; see also Allergy; Disease; Typhoid fever relation of water to, 808 Health and Hygiene, 184, 701 Hematuria; water-borne, 703 Hepatitis; infectious; inactivation of virus of, 703 Hexametaphosphate; see Phosphate Hot springs; effect of tides upon chemical composition of, 936 use of, for domestic supply, 395, 1159 Humic acid; use of, for softening, 810 Hydrants; inspection of, 1052, 1156

Hardness; see also Softening

Hydrogen; steel treatment with, to control corrosion, 1058

Hydrology and Conservation, 279

Hypochlorite; electrolytic; sterilization with,

Hydroelectric power; utilization of, in In-

Hydraulic laboratories; Ottawa, 388

Hydraulics, 385

dia, 283

1046

Iceland; hot water distribution in, 395
Illinois; Oak Park annual report, 111, 601
India; Bombay annual report, 1154
Madras; chemistry and biology of filters
in, 813
ravine reclamation in, 938
water supply in, 502
Indiana; Terre Haute; radial water collection in, 931
Industrial wastes; see Wastes; industrial

Industrial Water Supply, 710

Inhibitors; review of, 944 studies of, 606 Iodine; amount of, in waters, 934 correlation of water content of, to goiter Ion exchange; reaction velocity of, 598 use of, for softening, 809 Iowa; Des Moines annual report, 111, 601 Dubuque annual report, 1152 Iraq; Baghdad annual report, 1154 Ireland; Dublin water supply history, 498 water supply in, 498 Iron; determination of, 595, 1163 removal of, 108, 808 Iron bacteria, 103, 108 Iron-bearing waters; behavior and treatment of, 108 Irrigation, 279, 281, 282, 284

Japan; chemical composition of springs in 935, 936 effects of atomic bombing on water supplies in, 1054 Joint; pipe; design of flexible, 1157 Jointing materials, 391

Kansas; ground water in, 193 Kentucky; Louisville annual report, 111, 115

Larvae; removal of, by filtration, 811
Law; see also Legislation
Law, Litigation and Liability, 103
Lebanon; water supply in, 1055
Legislation; Argentinian; governing finance of sanitation services, 805
British Water Act (1945); 103, 193
Ontario; amendment to Public Utilities Act, 805
Liability; flood damage, 806
Lignin; technical; softening with, 107

Lignite; use of, for softening, 810
Lime; chlorinated; sterilization with, 286
treatment with, 107, 108
Limestone; upflow through, for acid neutral
ization, 811
Lithium; determination of, 595
Litigation; see Liability
Locomotives; see also Boiler feed water
water treatment for, 940
Louisiana; ground water in, 193
New Orleans annual report, 601
surface supplies in, 281

Magnesium; determination of, 110, 934 Mains; sec Pipe Malta; water supply in, 502

water hyacinth in, 938

598

1, 601

y, 498

ings in

ter sup-

11, 1153

finance

93

7

286

ater

1

Manganese; determination of, 595 removal of, 108, 109, 1046 Media; bacteriological, 706, 707, 709 Metaphosphate; see Phosphate

o goiter Meter; Venturi flume, 385 Methemoglobinemia; water-borne, 704 Michigan; Cadillac annual report, 1153

Detroit annual report, 112, 1153 Wyandotte annual report, 113, 602 Middle East; military water supply in, 499,

folybdenum; amount of, in waters, 936 sontana Public Service Commission; decision of, 105

Mosquitoes; destructive action of chlorine i treatupon eggs of, 287

> Vebraska; ground water in, 193 Netherlands; Amsterdam; pollution and self-purification of supply for, 1056 ground water in, 194

Witharen; use of automatic control at,

Neutralization; acid; upflow limestone bed for, 811

New York; Broome County; ground water of, 931

Cortland area; ground water of, 930 Elmira annual report, 1153

Long Island; ground water recharge in, 931

Mt. Vernon annual report, 602 New Zealand, Auckland annual report, 603, 1154

Clutha River valley, 938

Nickel; determination and amount of, 935 Utilitie Vitrates; as cause of methemoglobinemia in

infants, 704 Sitrifying filter; use of, for oxidation of ammonia, 812

Vitrites; determination of, 1163

Nitrogen; removal of, from steel surface, to control corrosion, 1058

neutral-North Africa; water supply in, 494, 499

Ocean water; see Salt water

odors; reduction of, by application of oxygen, 1156

Ohio; Cleveland annual report, 113 study of floods in, 939

Oil; recovery of, from sands, 1156 Oil field brine; pollution by, 193, 287

Ontario; Chatham annual report, 1154

Cochrane; construction in, 493 Hamilton; tank construction for, 1159 Kingston; filter plant and intake of, 812

Kitchener annual report, 1154

Ontario (contd.); St. Catherine's; construction in, 493

Toronto; construction in, 493 Wallaceburg; filter plant of, 813 Windsor; filter repair in, 812 Woodstock; construction in, 493

Organisms; removal of, by filtration, 811 Ovicidal agent; see also Bactericidal agents chlorine as, 287

Oxygen; application of; see also Aeration to reduce tastes and odors, 1156

Oxygen; dissolved; determination of, 491, 597, 935, 1163, 1164

Ozone; treatment with, 1047, 1048

Pacific islands; water supply in, 497, 499 Paint; prevention of corrosion with, 605 Paper mills; water supplies and wastes of, 102, 289

Pay; see Wages

Pennsylvania; Erie annual report, 602 Personnel; see also Employment; Wages training of, 807

pH; adjustment of, use of lime for, 108 determination of, 1162 influence of, upon bactericidal action of chloramine, 101

Phenols; determination of, 1164

Phosphates; calcium-sequestering value of,

corrosion control with, 944 determination of, 595, 942 sodium; hydrolysis of, 935 softening with, 809

tricalcium; fluorine adsorptiveness of, 934 Photometric analysis; method of, 1163

Pipe; aluminum; corrosion of, 606

asbestos cement; hydraulic properties of, 387

cleaning of, 712, 1157 corrosion of; see Corrosion

earth pressures on, in deep trenches, 1157 economical diameter of, 1158

lining of, with bitumen compound, 1158 reinforced concrete spun, 392

repair of, using ice plug, 1158 wood-stave, 396

Pipe flow; formula for, 387 Pipe jointing materials, 391

Pipe joints; flexible; design of, 1157

Pipe laying, 281, 393 Pipelines; see Pipe

Plant pests; water hyacinth, 938

Plants; toxicity of various substances in water to, 282

Plastic; use of, in pipe and fittings, 604

Soft

n

SC

te

ze

Soft

Solie

Solu

Sout

Wa

we

Sovie

Spre

Steri

see

chl

chl

chl

11

chle

elec

elec

hale

hete

iodi

ozo

pipe

silve

well

Storag

incr

Stream

Stream

Stream

tress

tront

Sulfate

Sulfite

Supers

Supplie

urface

Aust

Calif

India

Louis pollu

urface

uspen

wimn

yria;

11.

ter

ro

tic

Poland; evidences of pollution in water supplies, 1053

Polarigraphic determinations, 595

Pollution; see also Waste bacteriological tracing of, 101

danger of, from methods of railway sewage disposal, 702

evidences of, in water supplies of Germany and Poland, 1053

ground water; by oil field brine, 193 prevention of, 929

indexes for, 707, 708 prevention and reduction of, 287, 288, 290, 1056, 1057

Polyphosphates; see Phosphate

Potomac River Basin Com.; annual report of, 602

Precipitation; studies of, 280, 283

Pressure; importance of, in fire-fighting, 1049

Prince Edward Island; Charlottetown; pump cooling at, 1159

Pumping practice; effect of distribution grid upon, 393

Pumping stations; automatic control of, 1162 construction of, 1161

Pumps; automatic control of, 1055

cavitation of, 943 centrifugal, 385

cooling of, 1159 history of, 1161, 1162

improvements to, at London, 1159

propeller; use of, for tunnel booster, 1159 Pumps and Pumping Equipment, 1159

Purification: see also Aeration; Sterilization

electrical, 489

natural; see Self-purification

Quebec; Arvida water supply in, 493 discontinuance of chlorination in, 493, 494 Montreal; construction in, 494

Radial water collector, 931, 932

Radioactive tracer; use of, in measuring cooling water flow, 710

Railroads; water treatment for steam locomotives, 940

Railway sanitation; danger of pollution stemming from practices of, 702

Railways; water supply for, 712

Rainfall; see Precipitation
"Ranney" water collector; see Radial water collector

Rates; see also Charges, sewerage relation of, to wages, 804 schedules of, 803, 804

Re-aeration; use of, for pollution, 1056 Recharge; artificial, 931

Reclamation; ravine land, 938

Rectifiers; selenium; use of, for cathodic protection, 1058

Remote control; see Automatic control

Reservoirs; see also Dams cleaning of, 395, 1159

pollution of, by seagulls, 818 pumping equipment for, 1161

River gaging, 280, 939

River valley planning; India, 283 Rural water supplies, 107, 498, 1156 Rust; prevention of, see Corrosion

Sahara Desert; Mzab region, ground water in, 932

Salary; see Wages

Salt water; softening and rendering potable of, 489, 490, 1155

Sanitation; urban; sewage collection and treatment, 1057

Saskatchewan; Tisdale; hydrant inspection in, 1156

Scale; inhibition of, in boilers, 940, 941 Sea water; see Salt water

Sedimentation; see Clarification Selenium rectifiers; use of, for cathodic protection, 1058

Self-purification, 1056, 1057 Service; refusal of, 105, 106 Service charges, sewerage, 802

Sewage; railway; danger from methods of disposal of, 702

urban; collection and treatment of, 1057

Sewerage; charges for, 802, 803 Sewers; cleaning of, 712

Silica; removal of, 109, 942, 943

Silica sol; influence of, upon iron removal ulfate 808, 809

Silicic acid; determination of, 595, 942 Silver; determination of, 935

Silver ion; bactericidal effectiveness of, 103 Slaughterhouse wastes; disposal of, 1057

Snowfall; measurement of, for water supply prediction, 938 Sodium: determination of, 595

Sodium salts; softening by, 107, 109 Softened water; effects of, upon fish, 810

Softening; see also Ion Exchange; Sal water electrolytic, 809

humic acid, 810 ion-exchange, 809

lignite, 810 lime, 108

lime-soda, 107, 809

056

trol

cathodic

potable

on and

941

1057

057

Softening (contd.); phosphate, 809 rural plant for, 107 sodium salts for, 107, 109 technical lignin for, 107

zeolite, 809

Softening and Iron Removal, 107, 808 Solids; suspended; deposition of, 815 Solubility; calcium carbonate, 108 South Africa, Rand annual report, 603 water supply in, 494 well drilling in, 932

Soviet Union; see U.S.S.R. Spreading; water; see Recharge, artificial

Sterilization, 284, 1046 d water see also Swimming Pools

chloramine; influence of pH and temperature upon effectiveness of, 101

chloride of lime, 286

chlorine; see also Chlorination mode of action of, 284

chlorine dioxide, 285 electrical, 285

spection electrolytic hypochlorite, 1046 halogen compounds, 286

heteropolar cationic antiseptics, 286, 1049 iodine, 1047

cathodic ozone, 1047, 1048 pipe, 391

silver ion; effectiveness of, 103, 285 well, 286

Storage; see also Dams; Reservoirs hods of increase of, 816

Stream flow; studies of, 280, 939 Stream pollution; see also Pollution

Stream Pollution Control, 287 Stress corrosion; prevention of, 1058 trontium; determination of, 1163

emoval sulfate; determination of, 596 sulfate-reducing bacteria; aid given to corrosion of pipe by, 943

fulfites; effect of, upon oxygen determinaof, 103 tion, 1164

supersonic waves; activation of oxygen by, 1156

er sup-Supplies; see Surface supplies; Ground wa-

surface supplies; see also Irrigation a, 810

Australia, 281 e; Sal California, 937 India, 283

Louisiana, 281 pollution of, see Pollution

urface waters; U.S.; quality of, 933 uspended solids; deposition of, 815

wimming Pools, 598 lyria; water supply in, 1055 Tanks; concrete, 393

construction of, 1158, 1159

corrosion and corrosion control in; see also Corrosion

cathodic protection for, 605, 606, 1058 railroad; specifications for timber sub-

structures for, 712 steel, radial-cone, 1158

Tastes; reduction of, by application of oxygen, 1156

Temperature; influence of, upon bactericidal action of chloramine, 101

Texas; ground water in, 932

Tide; influence of, upon chemical composition of springs, 936

Tinian Island; water supply in, 499

Toxic substances; see Pollution; Plants; Bactericidal, Cysticidal, Ovicidal and Virucidal agents

Toxicity; degree of, to fish, of softened water, 810

Treatment; see also Boiler water treatment Treatment-General, 489, 1155

Treatment plants; see Water works Turbidity; see Suspended solids Typhoid fever; incidence of, 184, 190

Ultrasonic; see Supersonic

Underwriters' reports; fire protection, 1051 Union of South Africa; see South Africa United States; quality of surface waters in,

water works in; see entries under particular states

U.S.S.R.; Donets coal field; water supply in, 1055

Kara Kum dam in, 817

Soviet Armenia; water supply in, 1055

Vanadium; amount of, in waters, 936

Venturi flume meter, 385

Virucidal agents; see also Bactericidal agents chlorine, 192

Wages; level of, in public utilities, 804 Washington; Aberdeen annual report, 1153 Seattle annual report, 114, 1154

Washington, D.C.; see Potomac River Basin Com.

Wastes; industrial, 193, 287-290, 1057 charges for handling, 803 paper mill, 289

toxicity of, to fish, 288

Water development; Colorado River basin,

Great Britain, 1054

AB

AB

ABI

ADI

ADI

ADI

AG

ALI

ALI

ALI AM AM AN AN ANI ANI ARM Ass AZI BAI BAR BAR BAR BAR BAR BAR BAR BAS BAT BAY BEE, BELL BEN BER BERI BESS BETZ BIN BISE BISE BOEF BOES Bon Bon Boon Boro Bosy Bou: BRAI BRAS BRÉV BREV

- Water hyacinth; economic status of, in Louisiana, 938
- Water spreading; see Recharge, artificial Water wheels; use of, for pumping water, 1161
- Water works; Canadian; see entries under particular provinces
  - foreign; see entries under particular countries
  - United States; see entries under particular
- Water Works Annual Reports, 110, 600,
- Watersheds; forestation on, 283

- Wells and Ground Water, 193, 929
- Wells; drilling of, 194, 932
  - horizontal; see Radial water collector regulations governing (British), 193 sterilization of, 286
- West Virginia; pollution control in, 1057 Wisconsin; Green Bay annual report, 114, 602
  - Milwaukee annual report, 1154
- Wisconsin Public Service Commission; decisions of, 105, 106
- Wood pipe; use of, 1161
- Zeolites; use of, for softening, 809 Zinc; determination of, 936, 1163

# **Authors of Abstracted Articles**

ABBOTT, W. E., 597 ABPLANALP, GLEN H., 497 ABRAMOV, I. V., 1055 ADDISON, H., 500 ion; de ADELER H., 1049 ADLER, HOWARD, 934 AGAHKANYAN, GEORGI, 1055 ALBA, ADOLFO ORIVE, 284 ALLEN, A. J., 498 ALLISON, D. K., 1048 AMATO, FORTUNATO D., 934, 1163 AMISS, T. L., 1052 ANDERSON, C. S., 1156 ANDERSON, H. H., 385 ANDERSON, N., 1049 Andrews, F. W., 282 ARMSTRONG, W. J., 1047 ASSELSTINE, E. S., 930 AZNAR, D. C., 596

AWWA

ctor

193 , 1057

ort, 114

BAIN, R. E. D., 498 BAKER, G. C., 711 BAKER, M. D., 390 BAKER, M. N., 490, 1157 BARRETO, A., 1163 BARRETT, S. G., 1048 BART, S. G., 604 BARTSCH, A. F., 1056 BASAVILBASO, FELIPE CARLOS, 1164 BATY, JAMES B., 703 BAYNE, CHARLES K., 193 BEE, EDGAR, 494 Bell, R. N., 935 Bengolea, Daniel J., 934, 1163 Berk, A. A., 389 Berry, A. E., 287, 492, 803 Besselievre, Edmund B., 803 BETZ, P. L., 710 BINKLEY, O. F., 703 BISHOP ALAN W., 815 BISHOPP, FRED C., 704 BOERENDANS, W. L., 1157 BOESE, G. P. F., 279 BONIFACE, E. S., 394
BONNER, W. F., 1058 BOOTHMAN, A., 1048 Borgred, William F., 1155 BOSWELL, P. G. H., 395 BOUTSERIN-GALLAND, ANDRÉE (MME.), 810 Brady, Frederick J., 811 Brashears, M. L., Jr., 931

Brévot, G., 1057

Brew, JAMES D., 707

BRISSET DES NOS, ANDRÉ, 1161 BROADHURST, W. L., 932 BROOKOVER, T. E., 289 Brooks, C. E. P., 280 Brown, R. H., 931 Brownlee, D. S., 712 BRUCKSHAW, J. McG., 937 BRUNS, H., 1053 BUCH, KURT, 936 BUERGERS, T. J., 1047 BUTTERFIELD, C. T., 101

CADY, R. C., 193 CALISE, V. J., 489 CANNELL, H., 1052 CANTINO, E. C., 596 CARRUTHERS, N., 280 CASTELL, C. H., 712 CHANCE, N. A., 498 CHANDLER, R. B., 806 CHANEY, P. E., 606 CHAPMAN, GEORGE H., 706 CHENOWETH, B. M., JR., 703 CHIBBER, H. L., 938 CHIQUITO, L., 496 CHRISTENSON, C. W., 286 CHUBB, ROBERT S., 1057 CLARK, FRANKLIN D., 110 CLEVELAND, E. A., 492 CLEVERDON, ROBERT C., 707 COBLENTZ, J. M., 709 COOKE, W. TERNENT, 1053 COOMBS, GEORGE H., 192 Cork, Douglas, 599 Corsaro, G., 944 COURTNEY, J. L., 708 COVIL, WILLIAM F., 387 COWIE, D. B., 710 Cronkwright, A. B., 1053 Cross, WILLIAM P., 939 CUMMINS, R. W., 597 CUTHBERTSON, R. H., 1048

DAVIES, DELWYN G., 103 DEAN, H. TRENDLEY, 701 DEAN, R. B., 935 DECKER, J. M., 491 DE LOZIER, PAUL, 1156 DENMAN, WAYNE, L., 388 DE WEVER, A., 598 DIETERLE, EDWARD A., 1050 DOBBIN, R. L., 393

L

M

M

M

M

M

M

M

M

M

M

M

M

M

M

M

M

Me

Me

Mo

Mi

Mi

ME

ME

ME

MI

MI

MI

MI

MI

Mr

Mo

Mo

Mo

Mo

Mu

DRIESSEN, P. W. J. M., 1157 DUCAU, E. D., 108 DUNCAN, GLENN, 1159 DUNN, J. S., 491 DWYER, J. J., 390

EDMUNDS, F. H., 194 EDWARDS, S. E., 1046 ERLENBACH, FRANKLIN M., 701 EVANS, U. R., 604

Fabini, C., 190
Farley, F. F., 604
Farr, F., 286
Farrell, J. W. D., 393
Faucett, Robert L., 704
Feller, E. W., 389
Felsecker, John J., 809
Ferramola, R., 391
Ferris, J. G., 931
Folpmers, T., 102
Frydman, V. I., 941
Fuller, G. W., 502

GANAPATI, S. V., 813 GASSMAN, FRITZ, 936 GASTON, E. C., 941 GAULT, HENRI, 107 GAULTIER, M., 1057 GEHM, HARRY W., 492, 811, 1056 GENGRINOVICH, A. I., 597 GERRARD, W. F., 107, 388 GIBSON, K. M., 1163 GIBSON, W. D., 712 GILLES, E., 709 Gleason, George B., 931 GLEDHILL, E. G. B., 1158 GLOECKNER, A., 1048 GOETZ, PAUL C., 942 GOLDEN, F., 1049 Goodridge, John H., 502 GOWANLOCH, JAMES NELSON, 938 GRIFFITHS, J. H. T., 108 GRINDLEY, J., 288 GRUNBERG, L., 491 GUSE, V. C., 712 GUTH, J., 940

Hafford, B. C., 597
Hallink, G. J. J., 1055
Handrich, O., 708
Hankinson, L. E., 390
Hann, Victor, 1047
Hanson, Henry T., 1051
Hanson, M. A., 390
Harding, H. G., 1057
Harris, A. H., 703
Harris, W. Leslie, 702
Hart, P., 606

HART, W. B., 1057 HARTY, V. D., 817 HASELTINE, T. R., 933 HATCHER, MELVIN P., 803 HATCHETT, STEPHEN P., 287 HAWLEY, R. L., 935 HECKMANN, WILHELM, 710 HETHERINGTON, 395 HIONG, K. W., 107 HISLOP, T. W., 389, 605 Hobbs, L. F., 394 HOEK, H., 810 HOFMANN, E., 598 Hoskins, J. L., 1046 HOUGHTON, G. U., 596 HOWARD, C. S., 933 HOWARD, NORMAN J., 285, 489, 493, 1056 HOWLETT, E., 1047

IMHOFF, W. G., 944 INGLESON, H., 109 ISHIMARU, SABURO, 935

Jacob, C. E., 932.
Jaeger, Charles, 929
James, Herman G., 104
James, M. R., Jr., 1159
Janssen, C., 1164
Jones, Myrna F., 811
Jones, Paul H., 193
Joos, C. E., 389
Jordan, G., 1056

KAHLER, H. LEWIS, 389 KAIME, M., 1048 KALIES, W., 1047 KARRER, S., 710 KAUFFMANN, W., 808, 809 KAZMANN, RAPHAEL G., 931 KEMPF, J. E., 192 KEMPNY, JOSE C., 708 Kessel, J. F., 286, 1048 KLEIN, H., 702 KNOWLES, C. R., 712 Koblyanskii, A. G., 597 KOCHNEVA, E. G., 942 KOESTLE, 109 Kooijmans, J., 1056 Kostrikin, Yu. M., 941, 942 Koyama, Tadashiro, 933 Kramer, Norman, 707 Krevets, G., 1053 Krul, W. F. J. M., 194 KUCHMENT, M. L., 597 KURODA, KADZUO, 935, 936

LAFUMA, H., 606 LA GRANGE, C. C., 809 AWWA

1056

Lane, M., 489
Lang, J. D., 495
Lang, J. W., 932
LaQue, F. L., 605
Lawlor, J. P., 109, 499
Lea, W. S., 493, 1159
Leaf, Walter, 942
Leclerck, E., 598
Leech, T. D., 387
Leiguarda, Ramon H., 706
Leonard, Fred, 597
Leviel, M., 943
Levine, Max, 709
Liefrinck, F. A., 194
Linford, A., 385
Lockett, E. B., 502
Loiseleur, J., 1156
Louis, L., 286
Love, S. K., 933
Lupton, H. R., 393

LYNN, A. V., 1162

MABY, J. CECIL, 937 MACDONALD, J. C., 711 MACKERRAS, J. M., 705 MACLEAN, W. D., 285 MAMET, A. P., 944 MARKS, H. C., 284 MARMORSTON, JESSIE, 1049 MARSHALL, W. J., 285 MARTIN, N. D., 934 MASURCZAK, L., 101 Mawson, J. H., 395 MAXCY, KENNETH F., 702 McCall, G. B., 1046 McCrae, J., 815 McCulloch, Ernest C., 709 McDonald, H. J., 606 McDonald Norman G., 813 McLaughlin, Martin J., 286 McMillan, B. L., 394, 808 МсРнап, А. L., 493 MEARS, R. B., 1058 MENZHINSKAYA, E. V., 191 MERKEL, PAUL P., 1057 MERRILL, R. GOODALL, 283 MEULENHOFF, R., 1156 MILLER, A. J. McD., 938 MILLER, HERBERT C., 704 MILLER, L. F., 810 MILTON, R. F., 1046 MISCH, R. D., 606 MITOFF, D., 1163 MONNIER, D., 1163 Moore, F. J., 286, 1049 MORANI, VALENTINO, 279 MORTON, EDGAR, 814 MUDD, STUART, 708

Mumford, A. R., 941 Murdock, D. I., 712 Myers, E. M., 492

Nachod, F. C., 598 Neefe, John R., 191, 703 Neuner, Edward, Jr., 804 Neunzig, H., 606 Ninci, Mario, 392 Nissan, A. H., 491 Nordin, John R., 710

Ogborn, Courtney, 599
Oke, E. E. W., 493
Okuno, Hisateru, 933
Olin, H. L., 492
Olszewski, W., 707
Osborn, O., 606
Osman, W. S., 391
Ostrolenk, Morris, 707

PAGET, FRED H., 937 PALMER, HAROLD S., 929 PALMER, JOHN S., 1155 PAPE, C. H., 934 PARKER, LEO T., 806 PARKIN, C. M., JR., 1155 PARKINSON, LEONARD, 1056 PATERSON, A. M., 817 PAVER, G. L., 501, 1055 Peso, Osvaldo A., 706 Petrick, A. J., 809 PHILSON, P. J., 707 PICKETT, ARTHUR, 929 PIERCE, M. E., 192 PILZ, G. D., 604 PLANCHON, R., 711 Powell, E. G., 1052 Powers, John F., 390 ---- ET AL., 940 Prokhorov, F. G., 490, 811 Pugh, N. J., 394

QUIROS, M., 1048

RADCLIFFE, DEWEY M., 1159
RAINEAU, MICHEL, 284, 494, 932
RAMLOV, A. A., 941
RATHGEBER, I., 707
REID, R. L., 934
REGNALL, STIG, 396
REIGNER, M., 809
REINHOLD, JOHN G., 703
RENSONNET, O. L., 598
REZNIKOV, A. A., 595
RICE, EDWARD B., 281
ROBINS, F. W., 280, 1161

ROBINSON, H. A., 605 RODWELL, J. ARTHUR, 283 ROGERS, N. E., 389 ROHER, MIRIAM, 940 RUSCONI, Y., 1163

SAIFER, ABRAHAM, 110 SANBORN, J. R., 102 SAVAGE, W., 498 SAWDON, WALLACE A., 287 SCHAAF, E., 1163 **Schmitt**, Е., 389 SCHNEEBELI, W., 597 SCHUBERT, H., 101 SEAGREN, G. W., 605 SECREST, L. C., 605 SEVEROV, BORIS, 817 SHANNON, WILLIAM L., 281 SHAPKIN, I. F., 941 SHOTTON, F. W., 499, 500, 501 SILCOX, H. E., 712 SKERRETT, ROBERT G., 1155 SMAGINA, A. S. S., 595 SMITH, DOUGLAS BERNHARD, 1158 SMITH, HOWARD V., 490 SMITH, MARGARET C., 490 SMITH, R. J., 1058 SOKOLOV, I. YU., 933 Soule, M. H., 192 Speedie, Milton G., 815 SPITTA, 290 STAMMERS, F. M. G., 705 STAPLEY, EDWARD R., 813 STAUB, M., 597 STIMMEL, R. M., 388 STOKES, JOSEPH, JR., 191, 703 STOWMAN, KNUD, 703 STRANDSKOV, F. B., 284 STREATFIELD, E. L., 811 STREICHER, LEE, 809 STRICKLAND, G. HUDSON, 812 Subrabin, L. P., 1058 SUGAWARA, KEN, 933 SULLIVAN, J. R., 493 Sussman, S., 489 SUTHERNS, B. W., 1157

Tanaka, Nobuyuki, 935 Tanaka, Tikafusa, 935 Taras, Michael, 1162 Taylor, Ambrose G., 809 Teichert, W., 595 Thayer, Warren N., 931 Thornton, B. M., 942 Thorp, C. E., 1047 Tiger, H. L., 489 TISDALE, R. R., 808 TRACY, EDWIN T., 701 TREBLER, H. A., 1057

VACINO, EUSEBIO, 490 VAN ROYEN, R. P., ET AL, 944 VINSON, H. R., 1159 VISINTIN, BRUNO, 490 VOROB'EV, N. I., 596

WAITE, H. A., 193 WAITT, F. W. F., 281 WALKER, L. D., 1051 WALSH, B. R., 943 WARIN, J. F., 818 WATTIE, ELSIE, 101 Wautier, Jacques, 811 Webb, W. L., 390 WEBER, R., 280 WENGER, P., 1163 WENZEL, L. K., 193 WESLY, W., 108 WEST, R. F. K., 705 WESTON, L., 805 WHISKIN, C. L., 807 WHITE, H. B., 395 WHITE, W. N., 932 WHITEFIELD, F. G. S., 705 WHITELEY, DONALD, 808 WHITHEAD, E. I., 1163 WHITSON, M. T. B., 1048 WIKLANDER, LAMBERT, 103 WILCOX, CHARLOTTE E., 935 WILEY, AVERILL J., 1056 WILLEY, E. J. B., 940 WILLIAMS, CHARLES C., 193 WILLIAMS, GUY F., 389 WILSON, M. G., 192 WILSON, W., 806 WINSTON, JOE B., 1156 WISNIEWSKI, THEODORE F., 1056 WOLF, H., 606 Wood, Frank, 939 WOOD, W., 598 WOODLAND, A. W., 194 WRIGHT, SAMUEL ROBERT, 802 Wyss, O., 284

Yankovskii, K. A., 490, 811 Youatt, C. S., 1162 Young, G. H., 605 Young, T. N., 1158

ZATLOUKAL, V., 936 ZIENKIEWICZ, O. C., 814 ZOBELL, CLAUDE E., 710

